ARCHIVES OF OPHTHALMOLOGY.

PRIMARY SARCOMA OF THE IRIS.[1]

By Dr. CASEY A. WOOD,

PROFESSOR OF CLINICAL OPHTHALMOLOGY IN THE UNIVERSITY OF ILLINOIS,

AND

Dr. BROWN PUSEY,

ASSISTANT IN OPHTHALMOLOGY, RUSH MEDICAL COLLEGE, IN AFFILIATION WITH THE UNIVERSITY OF CHICAGO.

(*With five appended plates.*)

1. Introduction.
2. New Cases.
3. Abstracts of Previously Recorded Cases.
4. The Anatomy of Sarcoma of the Iris.
5. Occurrence of Sarcoma of the Iris.
   Relative Frequency.
   Age and Sex.
   Eye Attacked.
   Primary Location.
6. Etiology.
7. Course.
   1st Stage: Objective and Subjective Symptoms.
   2d Stage: Objective and Subjective Symptoms.
   3d and 4th Stages.
8. Differential Diagnosis.
   From Melanoma, from Gumma, from Tubercle.
9. Prognosis.
10. Treatment.

INTRODUCTION.

At the outset we desire to acknowledge our great indebtedness to the gentlemen who so kindly answered the circular letter on the subject of iris sarcoma that we sent out some months ago. The reader will soon discover that without their kindly and generous assistance this paper could not have been written.

It is of historical interest that the first cases of primary sarcoma of the iris recorded, in which microscopical examinations were made, are those of Hirschberg[38] and Lebrun,[42]

[1] From the Eye Clinic of the Chicago Post-Graduate Medical School and the Pathological Laboratory of Rush Medical College.

published in 1868. Preceding these records, Tay,[46] in 1866, reported his case as a primary *cancer* of the iris. The term cancer is often — more frequently in the past than at the present time — used to mean some form of malignant tumor; if Tay used the term in this sense, he should have the credit of recording the first case with histological examination. Antedating all of these cases, Stöber,[65] in 1853, described his case, observed during the years 1830–35. There was no histological report, but the patient died of what was supposed to be a brain tumor. In 1876 Kipp[33] reported a case and furnished the first review of the literature of the subject. Three years later Knapp[35] published an account of three cases, and added to the bibliography several cases which Kipp had overlooked. In 1882, Fuchs's[19] work, *Das Sarkom des Uvealtractus*, appeared, and in this monograph are collected the cases recorded up to that time — sixteen. In 1885, Pflüger[51] described an iris sarcoma, and collected other cases, among them the later history of Schiess's[52] Case 4, which he obtained in a personal letter from Profs. Schiess and Horner, and which, by the way, some of the later authors have not referred to.

Since 1885, Oemisch,[48] Ewetzky,[14, 15] Werther,[74] Veasey, and others have reported cases, made studies of this condition, and reviewed the literature of the subject,—the last three writers having completed the bibliography to the year 1898.

That our work may be of greater accuracy and, in our opinion, of more value, we have included in it only those cases in which a histological examination of the tissues was made and the clinical diagnosis thus confirmed. This excludes from our list some cases which are included in the lists of other authors. Among these are the cases of Eperon,[1] Horner,* Fuchs,[18] Arlt,[6] Nettleship,[47] von Hasner,[28] Owen,[49] Galezowski,[30] Berthold,[7] Stöber,[65] Roosa,[67] and others. In most of these cases the clinical diagnosis was made, but operation was refused. Dr. O. Pürtscher, of Klagenfurt, reports to us, in a private communication, a

[1] Cases reported by letter to Pflüger and cited by him in the *Bericht über das Jahr 1883*, Univ. Augenklinik in Bern.

case under his care at present, in which, while the diagnosis is plain, the patient will not allow operation; Czermak, W., sends us the clinical history of a case of iris sarcoma, but the removed tissue had not been examined histologically; Dr. J. O. Tansley, also in a private letter to the authors, describes a case of multiple sarcoma with several foci, two at least in the brain, one in the right iris and several upon the body. These cases must be excluded. Szili[35] speaks of examining histologically a globe which had been removed because of a small sarcoma of the iris, but gives no clinical history of the case.[1] Hess[37] records a case of sarcoma of the iris which he found in the eye of an ox.

That the bibliography may be as accurate as possible, and for other obvious reasons, we decided to make use of original articles or original communications only. The one exception to this rule is the report of Hubrich,[30] an abstract of whose article was taken from the *Jahresbericht über Ophthalmologie.*

The authors desire to acknowledge their great indebtedness to Professors Hektoen and LeCount for their kindly interest in this work.

Before discussing the subject of primary sarcoma of the iris in general, we introduce complete reports, with illustrations, of our own case and the cases of Drs. Coleman, Hotz, Denig, Friedenwald, and Komoto,[17] of Tokio, Japan. These gentlemen will report, or have already reported, these cases themselves. The case of Dr. Komoto is given in full with drawings, because, although previously published, articles in the Japanese language are practically inaccessible to the readers of this monograph. Also, before discussing the subject in its general aspects, we publish (1) abstracts of new cases, which have been sent to us from private records, and (2) abstracts of cases previously recorded. It has been our great good-fortune to have collected twenty-three unrecorded histories, which we are able to add to the sixty-four cases previously published. In our collection of previously

[1] Since writing the above Szili has kindly sent to us an abstract of the clinical history of this case (see Appendix) and histological sections from the globe.

recorded cases, some will be found that were overlooked in former bibliographies, notably those of Lawford and Collins,[40] Pansier,[50] Schneider,[63] and Wedl and Bock.[76]

We have purposely made the abstracts as brief as is consistent with clearness, and our questions in the circular-letter of inquiry were as few as possible, so that the gentlemen in answering would not be put to more trouble than was necessary.

THE AUTHORS' CASE.

On June 2, 1900, Mrs. C., age forty, presented herself at the clinic of Dr. Wood, complaining of a feeling of fulness in the right orbit, which she attributed to a growth in the eye. Patient states that she has never suffered from any serious illness. The family history, on the side of her mother, whom she says she closely resembles, is somewhat peculiar. The patient's mother, two maternal aunts, and one maternal uncle died of malignant tumors; one of these, an aunt, from recurrent tumor of the eyeball.

The patient has had no previous ocular affection, except an asthenopic attack five years ago, probably due to prolonged insomnia, from which she recovered entirely. In February, 1899, she noticed a sensation of fulness in the right eye, and about that time first perceived something growing on the iris. Shortly afterwards she suffered from supra-orbital neuralgic pains, accompanied by lachrymation—all confined to the right side. These symptoms led her to a more careful examination of the eye, and she observed two other smaller spots on the iris, one situated above and one below the pupil. (See Plate I., Fig. 1.)

On examination, the tension was + 1; the vision $\frac{6}{7}$. The superficial scleral vessels were slightly enlarged. In the horizontal median line on the temporal side of the right iris there was a dark brown, smooth, irregular, triangular new-growth; it was apparently of about the same thickness as the iris, and was elevated above its plane. The base of the neoplasm was 3 *mm* wide, and was applied to the root of the iris, while its apex did not quite reach the margin of the pupil when that aperture was in a state of medium dilatation. The tumor looked as if a piece of dark brown velvet had been laid on the iris. By oblique illumination the edges and some parts of the growth appeared to be translucent.

Its borders were sharply defined, its surface seemed homogeneous, and the neighboring iris tissue was not discolored or muddy. Two deposits of apparently the same character as the one described were located on the nasal half of the iris. They were of the size of pins' heads and were within, respectively, the upper and lower quadrants. (See Fig. 1.)

The pupil dilates irregularly with a mydriatic. There are no synechiæ, but the irregular dilatation is brought about by the fact that in the region of the tumor the pupil does not respond to the mydriatic. The media and fundus are normal.

The left eye is normal and the iris is free from abnormal pigmentation.

After keeping the patient under observation for a short time, a broad iridectomy (the only operation to which consent could be obtained) was done, including the whole of the temporal mass. Healing was uneventful.

After the operation the tension became almost normal (it is still somewhat raised) and the scleral injection less. In September, 1900, R V, with correction, is $\frac{20}{30}$ —. The patient complains of photophobia in a bright light, and of blurring if she tries to do near work.

As the patient can be kept under close observation, Dr. Wood agreed to delay further operative measures, warning the patient, however, of the dangerous character of the growth and the possibility of the necessity of enucleation of the eye if any further evidences of the new growth appeared. In March, 1902, there had (apparently) been no return of the neoplasm, and the ocular symptoms were the same as noted in September, 1900.

The tissue removed by iridectomy was about 5 *mm* long by 4 *mm* wide by 2.5 *mm* thick. It was hardened, then embedded in celloidin and sections made. The sections were stained by various methods. Histologically the tissue shows practically no resemblance to normal iris, with the exception that in a few sections there can be recognized a portion of the sphincter muscle, and in places one can make out the posterior epithelial pigment cells. The tumor consists of a mass of densely packed, small round and small spindle cells, with practically no intercellular substance (see Plate I., Fig. 2). Here and there cells are arranged in rows or in groups—alveolated. Where groups are found the cell formation is usually around a blood-vessel, and the cells just adjacent to the vessel seem to encircle it. There are blood-vessels with

normal walls, which are probably the vessels of the vascular system of the iris; and there are blood-spaces, such as are usually found in sarcomas. The cells are partly pigmented, in part unpigmented. The pigment is granular and of a dark brown color. The granules vary in size, but are usually very small. They are generally within the cell body, but in places are found scattered about, outside of the cells. The pigment does not give the iron reaction with potassium ferro-cyanide and hydrochloric acid.

Two types of pigment-bearing cells are seen—the pigmented tumor cell, and the branched pigment cell normally found in the iris. The latter are not very abundant and are, probably, the remains of normal tissue. In places the pigmented epithelial layer may be made out, and at several points in this layer there appears to be a cell-multiplication, constituting an invasion, as it were, of the tumor by these epithelial cells.

All of the tissue mass is sarcomatous—pigmented, small round-, and small spindle-cell sarcoma.

DR. W. FRANKLIN COLEMAN'S CASE.

The man, aged nineteen, first consulted Dr. Coleman January 2, 1901. He said that the right eye was injured six years ago by the explosion of a gun-cap and that inflammation followed and continued for three weeks. The eye recovered perfectly and remained well until four days ago, when it began to get red.

Status præsens.—R. E.: General subconjunctival injection, pupil small and oval, V = $\frac{6}{20}$, no pain. There is an old opacity of the cornea (probably at the site of the injury) and a grayish membrane at the lower margin of the iris, extending into the posterior chamber. There is no history of syphilis. Diagnosis: Iritis, foreign body in eye. (?) Prescribed atropin, etc.

Jan. 22d.—Pain in eye. Prescribed calomel, gr. $\frac{1}{10}$ hourly and heat to the eye. *Jan. 28th.*—Pain slight. *Jan. 31st.*—V = $\frac{20}{200}$. Cupped temple. *Feb. 8th.*—Relapse of pain. Prescribed potassium iodide, grs. 20, t. i. d. *Feb. 14th.*—V = $\frac{20}{100}$. Some pain. *Feb. 18th.*—Skiagraph negative as to foreign body in eye. *March 11th.*—Discontinued potassium iodide. Prescribed proto-iodide of mercury, gr. $\frac{1}{4}$, every 2 hours.

April 27th.—V = $\frac{6}{6}$. Pain severe last night. Lower half of bulbar conjunctiva, which has never been quite free from injection, is now extremely injected. With triplex magnifier a nodule is seen 2 *mm* in diameter and 2 *mm* high (the color of fresh pan-

creas) situated on the anterior surface of the iris, just external to the centre of the lower margin. The surface of the nodule is vascular—there being eight or ten vessels running over its surface. The growth begins about 1 *mm* from the pupillary edge of the iris, and extends to within 1 *mm* of its ciliary border. (See Plate II., Fig. 3.) The temporal side of the growth is covered by iris fibres running down and in, while the nasal side lies on the iris. There are several prominent episcleral vessels just below the cornea. Diagnosis (tentatively): sarcoma of the iris.

May 14th, the patient was exhibited at the Chicago Ophthalmological Society. Dr. Pusey thought the growth a sarcoma. Dr. Wood suggested potassium iodide for three months, and Dr. Bulson, the same remedy for ten days.

May 16th.—Prescribed potassium iodide, grs. 45, t. i. d., and *May 17th*, grs. 60, t. i. d. *May 18th.*—Pain in eye all night. General bulbar injection. Prescribed sodium salicylate, grs. 20, t. i. d. Discontinued K. I. *May 20th.*—Little pain or injection. Apex of growth ruptured and cheesy nodule escaped; this reaches to cornea. Dr. Wood examined the eye and reports: "Certainly the case looks very like a malignant tumor. The micro-telescope of Howe shows the extreme vascular character of the growth very well. What curious folds of the iris are produced by dragging on the pupillary edge!"

May 20th. Operation.—The growth was as completely removed as possible by an iridectomy, but the iris and growth were so adherent to the underlying tissues that they had to be removed piecemeal. These were placed in 10 % solution of formalin and given to Dr. Brown Pusey for examination.

June 4th.—The tension, which has been low since operation, is now normal. V = Fingers at 10 feet. On the report of the histological examination, enucleation was advised and refused.

Aug. 10th.—V = $\frac{6}{15}$. No redness of conjunctiva for past month. Fundus normal.

Feb. 12, 1902.—V $\frac{6}{20}$. No pain. Eye is usually quiet, but becomes red frequently—"about two days in a month."

The tissue removed by iridectomy was about 4 *mm* x 3 *mm* x 2 *mm* in size. It was fixed in 10 % formalin, embedded in paraffine, and serial sections were made. The sections were stained with hæmatoxylin-eosin.

Histologically, seen with a low magnification, the tissue has a reticular structure; it is full of nucleated cells, and the blood-

vessels are engorged. Resemblance to normal iris is entirely lost.

In a region where the cells are more closely packed and the area increased — evidently the portion which showed clinically as tumor — a high power (oil immersion) exhibits a mass of irregularly shaped cells with round and oblong nuclei (see Plate II., Fig. 4). These cells are fairly densely packed together. Some of them contain granular pigment. Scattered among these cells are many polymorphonuclear leucocytes, these being particularly abundant in and around the numerous blood-vessels.

In a region where the cellular tissue is loosely arranged the large cells above described are abundant, while the numerous leucocytes and the engorged vessels give the appearance more of an inflammatory area than of tumor growth. All of the excised tissue shows the presence of the tumor cells. The tumor is a round-celled, pigmented sarcoma, with the surrounding tissue showing an unusual degree of inflammatory reaction.

DR. F. C. HOTZ'S FIRST CASE.

The patient, a man aged thirty-two, first consulted Dr. Hotz in June, 1894. He stated that as far back as he could remember there had been a small spot on the lower nasal part of the iris of the left eye. This spot began to increase in size about one year ago. In June, 1894, there was a small flesh-colored tumor in the lower nasal quadrant of the iris, which projected to the posterior surface of the cornea, and pressed against it. The pupil was drawn out towards the tumor. There were no signs of inflammation. Fundus was normal. Tension increased. $V = \frac{20}{30}$. A few days after the patient was first seen, Dr. Hotz removed the tumor by "excision of iris portion to which the growth was attached by a broad base."

The eye made "a quick recovery ; for a time a grayish deposit was visible on the ciliary processes within the iris coloboma." The tissue was examined microscopically by Dr. Wm. H. Wilder, who confirmed the clinical diagnosis of sarcoma, and who kindly put his sections at our disposal.

The patient has been seen frequently since the operation by Dr. Hotz ; and on June 15, 1900, Dr. Hotz has the following note : "Coloboma perfectly clear, fundus normal. $V = \frac{20}{30}$ with Sp. $+ 0.50 \supset + 0.50$ Cyl. Ax. 180°."

Histologically, the tissue shows no resemblance to normal iris,

except that at the tip of the mass one can make out the altered sphincter muscle, and along the posterior surface there is a more or less altered row of pigmented cells. In confirmation of the fact that these are the pigmented cells of the *pars iridis retinæ* is the finding that they are continuous with the pigmented cells of the *pars ciliaris retinæ*. The latter cells remain as the lining of cross-sections of processes of the ciliary body, which processes are found in the sections (see Plate IV., Fig. 7). The tissue consists of a mass of densely packed small round and small spindle cells. The cells invade the whole tissue, including the ciliary processes. Some of the cells are pigmented, but the pigment is scanty.

The tumor is an alveolated, pigmented, small spindle- and small round-celled sarcoma.

DR. HOTZ'S SECOND CASE.

The patient, a healthy woman, age forty-three, stated that the tumor had been noticed for about two years. On examination of the eye it was found free from irritation. There existed in the lower temporal section of the iris a small flesh-colored nodular growth flattened against the cornea; the growth was attached to the iris by a narrow pedicle. The pupil was drawn towards the tumor. Tension normal. $V = \frac{20}{20}$.

The growth was removed by "excision of iris portion." "Healing uneventful and no recurrence after two years."

The histological examination by Dr. Harold Gifford showed non-pigmented, small round- and small spindle-celled sarcoma.

DR. R. DENIG'S CASE.

The clinical history is as follows: The patient, an Irishman, age fifty-four, consulted Dr. Denig March 26, 1900. For about four months he had noticed a decrease of the sight of his left eye. The right eye is normal. L.E. Vision $\frac{20}{40}$; the lower part of the cornea — beginning in the pupillary region down to the iris angle — is hazy; the fundus can be seen and seems to be normal. Reaction of the pupils normal, as are the visual fields, etc. No plus tension, although patient complains once and awhile of glaucomatous attacks in the affected eye.

The eye was enucleated March 30, 1900, and the recovery was uneventful. The patient was seen last in July, 1900, when he was in good health.

As is shown in the drawings lent us by Dr. Denig (Plate III.,

Fig. 5), the tumor extends forward and is intimately adherent to Descemet's membrane. It fills the angle of the anterior chamber in the region of its growth, and invades the ciliary muscle and ciliary processes; in the section at our disposal the ciliary processes are particularly involved, and the tumor is pulled away from the lens—probably in the hardening process. Adherent to the lens capsule are pigmented cells. The only remnants of the iris recognizable are the posterior pigment layer and the tip of the iris containing the sphincter muscle, which projects from the end of the tumor. In minute structure the growth is an alveolated, pigmented, small spindle-cell sarcoma (see Plate III., Fig. 6). The cells are quite small, with comparatively large granular nuclei, and they are arranged about blood-vessels. The growth closely resembles those tumors classed as *peri-endotheliomas* (Borrmann). The vascular spaces have very ill-formed walls. The pigment is evenly distributed, the cells in the region of the pigment layer of the iris and of the ciliary body containing most coloring matter. The section shows nothing more of interest excepting glaucomatous cupping of the optic nerve.

CASE OF DRS. AARON AND HARRY FRIEDENWALD.

The patient, a female, age fifty-five, first observed the growth but a short time before our first examination. Her attention was drawn to the eye by a slight impairment of vision. She is myotic and had been wearing glasses for years to correct this condition. In the left eye a granulation about the size of half a coffee-bean and of reddish color was seen in the upper-outer peripheral margin of the iris. The mass projected into the anterior chamber and in part filled out its angle. The pupil was somewhat irregular, vision slightly impaired, tension normal, slight ciliary injection especially in the region of the tumor.

Shortly after the eye was first seen, it was enucleated as a precautionary measure. In the enucleation the ocular conjunctiva was not dissected from the eye, but was removed with the eyeball; the importance of this was seen in the subsequent microscopic examination.

The patient made an uneventful recovery from the enucleation, and enjoyed good health for some time. Three years after the enucleation the patient died, and her physician, Professor Chambers, reported that her death was due to "cancer of the liver." There was no local recurrence, and we cannot say definitely that

the liver tumor was metastatic, though this is the most probable assumption.

Microscopical examination of the eye showed melanotic sarcoma of the iris involving the ciliary body (see Plate IV., Fig. 8).

Apropos of the statement of Drs. Friedenwald, in the above history, that "the ocular conjunctiva near the tumor was not dissected from the eyeball but was removed with it," and "the importance of this was seen in the subsequent microscopic examination," it is interesting to note, from our examination of the specimen, that in this specimen the tumor cells have perforated at the limbus, and that a large nest of sarcoma cells is found in the conjunctiva in this region (see Plate IV., Fig. 8). It is interesting, also, to note that the entire iris is infiltrated with tumor cells, and that even in the angle of the anterior chamber, opposite the site of the primary growth, tumor cells are abundant.

These findings undoubtedly prove the wisdom of the course followed in the treatment of the case, as expressed in the words of the report: "enucleation as a precaution." Another interesting finding, but one that we would expect, is the absence in this specimen of the ordinary indications of inflammatory reaction.

PROFESSOR KOMOTO'S CASE.

"Tokio, Japan, June 14, 1901.—I have reported this year in the Japanese journal of ophthalmology (*Nippon Ganka-sashi*, Bd. v., No. 6) a case of pigmented sarcoma of the iris, which seems to be the first case discovered in Japan. Dr. Kiribuci has written to me that it would be well to report the case to you, having forwarded to me the letter which you wrote to him. I have, therefore, decided to send the details to you."

Schioiciro Imamara, eleven years old, and the son of a farmer, was born in the village of Cognei, in the vicinity of Tokio. He is the second son, with father, mother, and brother in good health. Since early childhood he has had no illness worthy of note.

His eyes had always been sound until the beginning of September of last year, when there appeared something wrong with his left eye, for which he was treated by the village physician. As his symptoms did not improve, the boy's father brought him to an eye clinic. This was on the 22d of September, 1900. Upon

close questioning, it was found that since the 17th a dull pain had affected the eye and head, and that his eyesight had gradually failed.

Status præsens.—The patient is a healthy youth. The sound eye is emmetropic. The iris is blue. The diseased eye is hyperæmic about the cornea. The iris is, as a whole, markedly darker than that of the right eye. By indirect illumination one sees a tumor-like projection, which occupies the outer half of the iris, so that the pupil is crowded inward, and has a crescentic shape. The tumor is nearly spherical and almost touches the cornea. The cornea itself is somewhat opaque. The pupil is normal except for its altered shape. The interior of the eye can be well illuminated, but the papilla is not seen distinctly enough to say whether it is excavated or not. Vision is $\frac{20}{200}$. The eye is somewhat tender on pressure. Tension is clearly increased. Diagnosis: Pigmented sarcoma of the iris, with increased intraocular tension.

Enucleation was performed on the 24th of September and healing occurred without complications. The patient was discharged on the 14th of October, and has since returned several times for examination, but nothing unusual has been found.

The enucleated eye was hardened in formalin and sectioned. For microscopical study the specimens were freed from pigment and stained. It was found that the tumor was made up chiefly of pigmented round cells. The origin of these is the anterior layer of the iris; but since the spaces of Fontana are everywhere filled with the same cells, I could not decide definitely whether the pigment cells floated off the tumor and settled upon the surface of the iris and the lymphatic outlets of the anterior chamber, or whether the pigment cells of the surface of the iris—that is to say, the cells of the anterior reticular layer—were encroached upon by the tumor. But I am inclined to the former view, for both the pigment cells upon the iris, as well as those in the lymphatic spaces, are round cells.

The first figure (see Plate V., Fig. 9) shows that the pigment cells are not entirely freed from pigment. In the second figure (see Plate V., Fig. 10), much magnified, one sees clearly that the cells are round cells.

In Japan sarcoma is exceedingly rare. Among 35,000 patients, I have seen three cases of pigmented sarcoma of the choroid; of sarcoma of the iris one case, reported here. I have forgotten to

state that the field of vision was equally contracted upon all sides (to about 20°).

APPENDIX.

A. Szili, Jun., has sent to us the following history of the case of iris sarcoma that occurred in his father's practice:

The patient was a woman aged thirty-five, who stated that complete blindness of the right eye was observed only two weeks before. The eye presents the phenomena of chronic primary glaucoma, with clear media and deep total excavation of the optic disc. On closer inspection, there is to be observed in the inferior part of the otherwise light-brown iris a dark triangular spot, whose upper edge reaches almost to the pupil and whose base apparently overlaps the ciliary margin. This slightly prominent spot had a felt-like surface, which is very different from the thoroughly normal structure of the remaining iris. T. +2; V. 0. Diagnosis: neoplasm of the iris.

The eye being totally blind and there being no certainty that the intrusion of the tumor into the ciliary body could be excluded, the enucleation of the eye was proposed and performed.

The microscopic examination shows a fuso-cellular sarcoma, arising from the iris angle and overlapping the iris and a part of the ciliary body. Sclera and cornea were quite intact.

THE ANATOMY OF PRIMARY SARCOMA OF THE IRIS.

I.—MICROSCOPICAL APPEARANCE.

The microscopical appearance of a primary sarcoma of the iris can be determined only in those cases in which the affected globe was enucleated. The drawing from Denig's (see Plate III., Fig. 5) case well illustrates the conditions. Here the diameter of the base of the tumor is greater than the antero-posterior diameter, and the growth has a more or less regular outline. Outline drawings also illustrate the articles of Hirschberg, Helleberg, Kerschbaumer, Schiess, Mayweg, Wedl and Bock, Werther, and Komoto (see Plate V., Fig. 9), and present much the same picture as the drawing from Denig's case.

Ordinarily, one finds in descriptions of sarcoma of the eye, the expressions *diffuse sarcoma* and *circumscribed*

sarcoma. These terms are really only relative. The circumscribed sarcoma, as Kerschbaumer[1] says, "shows less tendency to grow on a plane surface." An absolutely circumscribed sarcoma of the eye is certainly a great rarity. Denig's case would have to be classed as a diffuse growth; in the other cases, where there are drawings of the tumors *in situ* (Hirschberg, Helleberg, etc.), the growths are diffuse. Sarcomas of the iris are in no sense circumscribed,—they are diffuse growths.

II.—HISTOLOGY.

Microscopically, sarcoma of the iris exhibits no material differences from the same neoplasm growing in other portions of the uveal tract; it develops under the same anatomical conditions, and shows like peculiarities; hence, an extended description of the histology of such a tumor is not necessary here. It is appropriate, however, to call attention to a few points.

It is an interesting characteristic of these tumors that, in nearly all cases, they consist of small round and small spindle cells. In the specimens that we have studied these are the predominating forms.

In considering the histological reports of these tumors, one finds frequently the statement that karyokinetic figures are absent, and that there is a noticeable absence of cells with two or more nuclei. In the histological specimens that we have studied, no mitotic figures were found. This evidence of a slow rate of growth is corroborated by the finding in the tissues at our disposal a tendency in the cells to arrange themselves in groups or in rows—alveolation. The tumors that we have studied have the appearance of the growth which is usually described in general pathology as fibro-sarcoma. These histological findings agree perfectly with the clinical observation of the usual slow growth of such tumors.

In these specimens, interesting and striking features were that the tissues showed no evidences of degenerative changes and very little inflammatory reaction. As to an inflammatory process, the one exception to this was in the case of

[1] Kerschbaumer, *Das Sarkom des Auges*, p. 31.

Coleman. In this case the tissue of the iris, in the parts adjacent to the region of more densely packed sarcoma cells, showed an irregular network of eosin-staining material with meshes that are often circular—the result, no doubt, of the coagulating action of the fixing fluid upon an inflammatory œdema; and in this exudate there were a great many polymorphonuclear leucocytes. These leucocytes were also found, but in fewer numbers, in sections showing densely packed sarcoma cells.

The cells of these tumors are usually said to take their origin from the stroma cells,—mesoblastic tissue,—and some authors speak of tumors arising in the anterior layers of the iris, others the posterior. Quite a few of these tumors have grown from congenital nævi—at least eleven cases. This is the proper place to call attention to the fact that Durante and Unna and, more recently, Abesser[1] and Larass[2] hold that the pigmented moles of the skin are of epithelial origin. If this is so, then it is possible that pigmented nævi of the iris are also of epithelial origin. And, if they are, we would have to adopt the term suggested by these observers, melano-carcinoma, at least, for those iris tumors that have had their origin in pigmented nævi.

While no mention is made of hæmangio-sarcoma of the iris, and there is no published report of such a tumor, it must be said that in three of the specimens we have studied the arrangement of the cells around the blood-vessels greatly resembles the arrangement usually described under the term peri-endothelioma (Borrmann).[3]

Leber[4] called attention to the fact that pigmented epithelial cells may multiply in sarcoma of the choroid, and that some of the pigment cells of such tumors may have their origin in these cells. In sarcoma of the iris we also notice a similar process.

The blood-vessels and blood-spaces of iris sarcomas do not differ in their structure from those of similar tumors arising

[1] *Virchow's Archiv*, 1901, vol. clxvi., p. 40.
[2] *Inaugural Dissertation*, Leipzig, 1901.
[3] R. Borrmann, "Zum Wachsthum und zur Nomenclatur der Blutgefässgeschwulste." *Virchow's Archiv*, 1899, vol. clvii., 2, p. 297.
[4] *Graefe's Archiv*, vol. xliv., 3, p. 683.

from other portions of the uveal tract, or, indeed, from those found in ordinary sarcoma.

Sarcoma of the iris is usually pigmented, although eleven cases are recorded as unpigmented. The character of the pigment does not vary from that of uveal sarcoma and it is distributed in the same manner. This is hardly the place to consider questions of the origin or chemical composition and properties of the pigment of melanotic sarcomas[1]—questions which are still subjects of contention.

There should not be much difficulty in distinguishing microscopically a sarcoma from a tubercle, a gumma, or from a nævus. The diagnosis will depend on well-known general histological facts.[2]

RELATIVE FREQUENCY.

We have histories of eighty-three cases in which the clinical diagnosis was confirmed by histological examination. In addition to these cases there are records of five or six cases in which the diagnosis can hardly be questioned. It may be said, then, that a most careful search shows that there are on record about ninety cases of primary iris sarcoma. We would, however, call attention to the fact that our collection of cases indicates that this condition is not nearly so rare as one might conclude from a perusal of previously issued monographs on this subject. We have records of eighty-three cases in which histological examinations were made; this almost doubles the number collected by recent writers on this subject. For example, Veasey,[11] in his collection has forty-four cases, while Werther[16] added twenty-three to Fuchs's sixteen cases.

If one considers the relative size and area of the iris and the choroid and compares the number of choroidal sarcoma cases with these ninety instances, the conclusion is forced upon us that, relatively, the iris is as often the seat of sarcoma as is the choroid.

---

[1] See James Ewing, "Pathological Anatomy of Malarial Fever"; "The Malarial Pigments," *The Journal of Exp. Medicine*, 1902, vol. vi., p. 174.

[2] One of the authors of this paper (Dr. Pusey) hopes at a future time to present the subject of the minute anatomy and genesis of these tumors more thoroughly.

As to the frequency with which, in comparison with other eye diseases, iris sarcoma is found, no reliable statement can be made. Knapp has reported the greatest number of cases—four. It is fair to presume that this represents all the cases he has seen; it would be hard to estimate the number of clinical eye cases that Knapp has had under his charge and, therefore, the number of eye cases from which his iris sarcoma cases have come. We have had numerous letters from gentlemen who, with an immense clinical material both private and public, have never had a case of iris sarcoma; among these, for example, such men as Dr. Myles Standish, Prof. Groenouw, and Dr. Risley. There can, therefore, be no doubt but that sarcoma of the iris is one of the rarest of the eye lesions.

AGE.

The table given herewith shows the ages of patients affected with this disease. Twenty-seven cases were observed in individuals under thirty years of age, and fifty-seven after thirty years of age; which facts indicate that iris sarcoma is more common in the latter half of life. As will be seen later in this study, this point may be at times of some importance in differentiating between sarcoma and tubercle of the iris.

1–10	10–20	20–30	30–40	40–50	50–60	60–70	70–80	80–90	90–100
2	13	29	38	47	55	66	74		
7½	15	21	38	43	53	64	72		
6	16	23	36	49	53	67	75		
7	19	28	36	42	53	60			
	19	22	36	47	55	60			
	11	25	35	43	50	62			
	20	21	36	46	55	65			
	16	21	38	49	51				
	14	24	36	49	59				
	19	25	32	43	58				
	11	23	38	40	54				
		22	39	40	54				
			32	46	50				
				49	51				
				41	54				
				40	54				
				43	55				

SEX.

Of the cases in which the sex is recorded thirty-six were males and forty-five were females. If conclusions may be drawn from this number of cases, females are more often affected by primary iris sarcoma than males.

Apropos of the fact that this collection indicates that, probably, females are more often than males the subjects of sarcoma of the iris, it is instructive to refer to a recent exhaustive study of intraocular tumors of the optic nerve by Byers.[1] Byers collected ninety-eight such cases; of these, fifty-nine were in females and thirty-nine in males.

EYE ATTACKED.

Of the cases in which the side attacked is mentioned, thirty-three were in the left eye and twenty-eight in the right eye. In Carter's case both eyes were affected—one of the four or five instances in which sarcoma affected both eyes.

PRIMARY SITE OF THE GROWTH.

In thirty-five cases the primary position of the tumor was in the lower half of the iris; in thirteen cases, the upper half; in five cases, the inner side; and in two cases, the outer side. It is a curious fact that in such a large percentage of the cases the growth first appeared in the lower part of the iris.

In Fuchs's collection of cases, the primary position of the tumor was in the lower part of the iris in every instance except that of Fano. Zellweger[*] (in 1888) affirms that, almost without exception, the lower part of the iris is the primary site of the tumor, and commenting on this finding, says: "Es ist dies wohl mehr als eine blosse Zufälligkeit." The more recent cases, however, furnish a higher proportion in which the primary position is in the upper part of the iris; so that the finding of the primary position in the lower part of the iris was merely a coincidence in the early cases.

---

[1] W. G. M. Byers, *Primary Intradural Tumors of the Optic Nerve.* Montreal, 1901.

It is generally supposed that the world's inhabitants are about equally subject to sarcoma, but Prof. Komoto (see p. 334) says: "In Japan sarcoma is exceedingly rare. Among 35,000 patients, I have seen three cases of pigmented sarcoma of the choroid, and one case of sarcoma of the iris." This finding of Komoto is certainly unusual, and is worthy of note. It is interesting to contrast it with recent statistics of the largest eye hospitals of America and England—the New York Eye and Ear Infirmary[1] and the Royal London Ophthalmic Hospital,[2] respectively,— which show about eight cases of uveal sarcoma per 30,000 patients.

COURSE AND SYMPTOMS.

The clinical history of the course and development of an iris sarcoma is the same as that of any intraocular tumor. It usually resolves itself into four stages, in accordance with the classic description of Knapp.[a]

One of the most remarkable clinical points about the development of such a growth is the great length of time that it may exist without causing inflammatory symptoms — the first stage of development of an intraocular tumor. If one does not recall what is seen histologically in the tissues in the neighborhood of an iris sarcoma, it would seem almost impossible that such a growth could exist so long, and yet set up so little inflammatory reaction. The foregoing histories furnish numerous instances of the growth of tumors for months and even years without making the eye red and without interfering with the motility of the iris.

The most striking objective symptom of the *first stage* is a growing tumor, which is usually pigmented.

Iris sarcomas are frequently nodular, and often their blood-vessels may be seen. Sometimes several tumor masses show in the same iris. As is well known, in intraocular tumors the blood-vessels of the conjunctiva and sclera in the region of the growth may become engorged and prominent; such a condition was noted in Dr. Coleman's case and Schiess's first case.

---

[1] *New York Eye and Ear Infirmary Reports*, 1901.
[2] *Royal London Ophthalmic Hospital Reports*, xv., 1899.

An interesting symptom, subjective and objective, which has frequently been observed in the first stage is recurrent hemorrhages into the anterior chamber. Such bleedings seem to occur spontaneously, and have several times been the cause of sending the patient to the doctor.

In the first stage there may be no subjective symptoms. Sometimes the tumors grow into the region of the pupil, and so interfere with vision.

In the second stage the typical case shows the symptoms usually exhibited by other intraocular tumors. Of the objective symptoms, of course, the most striking, as in the first stage, is that of the presence of a tumor in the iris. There is general injection of varying degree; there may be lachrymation. The cornea is often hazy from glaucoma. On Descemet's membrane there may be deposits. It may be well here to remind the reader that iris sarcomas have been clinically called "white tumors" (Kipp's case), that were histologically melanotic.

The iris in the region of the tumor may look muddy and "off color," while in other situations, even in the inflammatory stage, it will appear perfectly healthy and react normally to light and mydriatics. The use of the latter will frequently discover synechiæ behind the growth. The *tension* may be increased to any degree, or, as in Hosch's case, there may be no increase of tension. If intraocular tension has existed for a long time, there will be cupping of the optic nerve.

Of the subjective symptoms, the most important is that of decreased visual power, which may vary from slight obscuration—caused by intraocular tension—to blindness. Contractions of the field of vision—caused by glaucoma and invasion of the pupil by the tumor—are to be expected. The eye may be painful and there may be frontal and temporal headache.

The symptoms of the third and fourth stage are those due to the perforation of the walls of the globe and to the formation of metastases, such as are seen in any other intraocular growth, and consequently do not call for description.

DIFFERENTIAL DIAGNOSIS.

In the first stage of its development, a small pigmented sarcoma of the iris may easily be confounded with a *simple melanoma*. The point of greatest importance in the differential diagnosis between these tumors is the fact that a simple melanoma is stationary, while a sarcoma is a progressive growth. If the question should arise as to whether a suspected tumor is increasing in size, and is, therefore, sarcomatous, it would be proper to wait a while. A month or two would probably be long enough to settle this point. If the diagnosis cannot be made clinically by waiting, it certainly could be made promptly by examining the suspected growth histologically; it would be proper in a suspicious case to remove a portion of the tumor by iridectomy. Simple melanomas are congenital. This also is a point of great importance, but one must remember that the patient's evidence in such a matter is frequently very uncertain. A point of some importance is that a melanoma is usually more pigmented and, therefore, darker in color than a sarcoma. It is to be remembered, also, that simple melanomas do not, as a rule, project above the plane of the iris. In the second stage of its development there can be little trouble in differentiating between sarcoma and melanoma; a melanoma does not cause inflammatory symptoms or glaucoma. Of course, a patient with melanoma might exhibit inflammatory symptoms, due, for example, to syphilis; but such a case could probably be promptly decided by the history and the other symptoms. The same might be said of a possible combination of melanoma in an eye with inflammatory glaucoma due to other causes. If the question could not be otherwise settled, it would be proper to excise the suspected growth by iridectomy, and examine it histologically; in the case of acute inflammatory glaucoma with suspected melanoma the iridectomy would be the more indicated, for evident reasons.

The differential diagnosis from *gumma* and *tubercle*, in the first stage of the development of sarcoma of the iris, should offer no difficulty; a tubercle or gumma could not long exist in the iris without causing inflammatory reaction. In the

second stage some difficulty might be encountered in making a diagnosis. Here the history will be of great importance. At the first onset of gumma or tubercle there are inflammatory symptoms, while sarcoma may grow for weeks or months with no inflammatory reaction. In many cases sarcomas have developed from pigment spots which have been observed for years; the history may bring out such a fact. If the patient has had syphilis, the therapeutic test of the administration of mercury and the iodides on the growth may be resorted to. The existence of tuberculosis in other portions of the body should be determined. The age of the patient would be of some importance in differentiating between a localized tubercle and a sarcoma, and should be considered. Most sarcomas occur late in life while tuberculosis is rather an affection of adolescence. A suspicious circumstance would be a history of previous attacks of obscuration of vision; these would indicate sarcoma, for in a number of these cases there are histories of recurrent hemorrhages into the anterior chamber, and also glaucomatous attacks.

The appearance of the iris throws much light on the subject. In sarcoma the iris is usually swollen, muddy, and inactive to light and mydriatics only in the region of the growth; in tubercle and gumma, on the other hand, there are symptoms of severe and diffuse iritis, with haziness of the aqueous and probably hypopyon. It is a fact that hypopyon is not mentioned as present in a single case of iris sarcoma. In many instances of the latter there have been multiple points of growth visible (*e. g.*, our case, Hubrich's, Alt's second case, and in the case of sarcoma of the iris and ciliary body recently reported by von Rechtperg " from Fuchs's clinic). This fact must be remembered, and it is spoken of here particularly because different authors have made the statement that multiple tumors indicate tuberculosis, and have said that such a condition is of great value in differential diagnosis (for instance, Fuchs's *Das Sarcom des Uvealtractus*, p. 232).

Most sarcomas of the iris are pigmented; hence the dark appearance of a suspected growth points to sarcoma, but it

must be remembered that some sarcomas are non-pigmented, and even some pigmented sarcomas have appeared to be "white" clinically. On the other hand, a small gumma situated in a dark iris with its engorged vessels may seem quite dark in color. The value of the appearance of the growth in diagnosis may also be destroyed when the tumor is seen through a hazy cornea.

The degree of inflammation is of much importance; gumma and tubercle cause the greater reaction.

A statement said to be of differential diagnostic value between tubercle and sarcoma is that the latter seldom or never perforates at the limbus (Kerschbaumer).[1] Yet in one case (Friedenwald's) perforation did occur at the limbus.

If, after a consideration of the clinical points just enumerated, and especially if the tumor does not disappear under anti-syphilitic treatment, the diagnosis is still unsatisfactory, we would advise the removal of the growth and its examination histologically.

At the New York Eye and Ear Infirmary, Dr. Pusey saw a lens dislocated into the anterior chamber, which might have been confounded with an iris sarcoma. The patient was an unintelligent woman, who spoke one of the dialects of Eastern Europe, so that no history was obtainable. The eye was glaucomatous, and behind the hazy cornea a small ($\frac{1}{3}$ the size of the normal lens) whitish mass was seen lying on the iris downwards and inwards. It looked very much like a tumor, but the fact that the iris was slightly tremulous and lay unusually far back, making a very deep anterior chamber, attracted attention. The diagnosis was plain when the patient was made to lie down and move the head, for then the mass moved about in the anterior chamber.

ETIOLOGY.

The etiology of sarcoma of the iris is that of sarcoma in general, or, at any rate, of *pigmented* tumors. This is not the place to consider such a subject at length—a subject which is just now engaging the attention of pathologists the world over.

[1] *Das Sarkom des Auges*, Wiesbaden, 1900, p. 36.

A fact that especially attracts our attention, and which may be best noted here, is the development of these tumors from congenital pigmented nævi. In ten cases (or 11.62 %) (Charnley,[10] Hirschberg,[28] Hosch,[29] Schiess,[62] v. Hippel,[72] Whiting,[77] Wiegmann,[78] Fick,[17] R. Sattler, and Hotz's first case) there is a clear history from early youth, of pigmented lesions from which subsequent sarcomas developed. This is a large percentage of cases; it is, however, probably not the correct percentage in which sarcomas have taken their origin from congenitally pigmented areas. It is probably much too low. In seventeen other cases there is a history of a spot on the iris, which had been noticed for varied and uncertain lengths of time before it began to grow. There is such a history in Andrews's[5] first patient, where the spot had been noticed for five or six years; and in Andrews's[6] second patient, where the spot had been noticed for a "long time"; in Buffum's,[8] eight years; Collins's,[11] four and one half years; Ewetzky's[16] second case, nine years; Kipp's,[33] twelve years; Knapp's[35] second case, "many" years; Knapp's[35] third case, ten years; Krükow's[39] seven years; Lawford and Collins's,[40] three years; Mayweg's,[46] sixteen years; Oemisch's,[48] five years; Pflüger's,[51] six years; Pflüger and Horner's,[52] ten years; Solomon's,[61] twenty years; Veasey's,[71] eight years; and Nelson and Thompson's, twelve years. As will readily be granted, all the probabilities are that the statements regarding the length of time these spots had existed are not accurate; it is more than probable that the pigmentations, in many instances, were congenital, but had not been noticed until something attracted the attention of the patient to them, and the patient had dated their existence from the time of such observation. This being the case, the percentage of cases in which the tumors have grown on preëxisting pigment lesions should be largely increased. It must not be forgotten, however, that, possibly, in some of these last-mentioned eighteen cases, the "spots" were really the sarcomas themselves, for it is a well-known fact that these tumors may grow exceedingly slowly.

It probably is a fact that pigmented nævus of the iris is in

every way similar to the same tumor in the skin; it certainly is a fact that, clinically, a pigmented nævus of the iris should be regarded by the ophthalmic surgeon with as much suspicion as a pigmented mole in the skin is observed by the general surgeon, and there is no better place in this paper than this to say that such a growth in an eye, associated with inflammatory or glaucomatous symptoms, should arouse suspicion and be dealt with accordingly.

In the case of Schneider,[65] a brown spot was noticed five months after an injury; six years later a tumor developed on the brown spot; in Helleberg's[36] case, there was an inflamed eye from a blow four years before the tumor developed; in the cases of Thalberg[66] and of Walker,[73] the tumors developed in eyes from which cataractous lenses had been extracted; in the case of Sattler and Krückmann, an iridectomy had been done on the eye for inflammatory glaucoma; in Coleman's case there was a history of injury six years before the development of the tumor. These are the only cases in which there is a history of preëxisting inflammation caused by traumatism. By way of comment, it may be said that this is a very insignificant number when compared to the total number of iridectomies, cataract extractions, and similar injuries in this region.

In contrast to the fact that sarcomas of the choroid have been known to develop in atrophic globes—indeed, seem to have a predilection for such eyes, it is interesting to notice that there is no recorded case of sarcoma developing in the iris of such an eyeball.

PROGNOSIS.

The surgeon will be called upon for a prognosis, not only as regards the eye, but the life of the patient.

On the subject of retaining an eye afflicted with a sarcoma of the iris, the authors would refer the reader to the classification of cases under the heading of treatment. In that classification, it will be seen that in four cases iridectomy was done, and there was no apparent recurrence of the disease for "five years," "many years," "four years," and "eleven years," respectively.

As regards the life of the patient, the prognosis in iris sarcoma is the same as in all sarcomas; safety depends on the early and complete removal of the growth.

TREATMENT.

There has never been any difference of opinion as to what should be done when such a growth is met with. Nobody has denied the proposition that a sarcoma of the iris should be removed as soon as the diagnosis is established; but what constitutes *effective* removal has given rise to great differences of opinion, and these differences have been the main cause of our undertaking the work herewith presented.

An idea of the varied advice to be found on the subject of treatment may be gotten by reading a few monographs and articles upon this subject.

Fuchs[1] says that iris sarcoma may be excised by iridectomy if it be small enough to be entirely removed. Pflüger practically affirms the same thing when he says that the prognosis, so far as the eye is concerned, is good as long as the sarcoma is limited to the iris. Oemisch, Veasey, and Knapp treated their cases by iridectomy.

Andrews, in writing of his last case, says: "It is impossible to determine in a given case whether the ciliary body is involved." Kerschbaumer[2] says that from her observations, from the literature, and her own cases, she must deny that we are right in retaining the globe when an iris sarcoma exists, and says: "So wenig ein Chirurg bei Carcinoma Mammæ nur eine lokale Extirpation eines Carcinomknotens ausführen wird, ebenso wenig sollte ein Ophthalmolog bei Augensarkomen nur eine lokale Operation vornehmen." Werther[3] advises as the only treatment the enucleation of the globe.

Fuchs's advice has been widely quoted and has probably been the cause of misunderstanding, and possibly harm, inasmuch as his dictum has been construed as favoring re-

[1] *Das Sarcom des Uvealtractus*, Wien, 1882, p. 282.
[2] *Das Sarkom des Auges*, Wiesbaden, 1900, p. 252–253.
[3] Werther. "Ueber das Sarcom der Iris." *Archiv f. Augenheilk.*, xxxii., p. 303.

moval by iridectomy, although he distinctly says that iridectomy is only to be done when the tumor can be *entirely* removed by such an operation. His statement on the subject can only be interpreted as meaning that, at times, sarcoma can be recognized as localized in the iris, and then it can be removed by iridectomy.

The question before us is: Can we determine clinically that a particular growth is limited to the iris? We are assisted in coming to a conclusion by a consideration of the cases that have been observed.

It is hardly necessary to state the fact that this is an important subject. On the one hand, there is the chance of preserving an eye — removal by iridectomy; on the other, the possibility of endangering the life of the individual by failure to remove the whole tumor. In some of these cases the surgeon's responsibility is lightened by the fact that the growth has already seriously impaired the eye as a visual organ; every one will grant that in such a case the question of treatment is simple.

The recorded cases, as regards the histological findings and the results of treatment, may be conveniently classified, and light from these is thrown on the subject of treatment generally by considering (1) the cases in which enucleation was done—the histological findings and (2) the cases in which iridectomy was done—the after-history and the histological findings. A classification has been made as follows:

ENUCLEATION (E1).

Histological Examination of the Globe Showed Involvement of Other Parts than the Iris.

ADAMS[1] ..... Secondary deposits in ciliary muscle.
ALT (1st case) ..... Ciliary body involved.
ANDREWS (2d case) .... Growth extended beyond iris.
BUFFUM ..... Globe involved.
COLLINS ..... Region of canal of Schlemm and ciliary muscle and processes involved.
EWETZKY ..... Secondarily in ciliary body.
HELLEBERG ..... Ciliary body involved.

[1] See the abstracts of these cases.

GRIFFEN.....Ciliary body involved.
GRUENING.....Ciliary body involved.
HIRSCHBERG.....Tumor was adherent to lens.
KERSCHBAUMER.....Ligamentum pectinatum and Schlemm's canal involved.
KERSCHBAUMER.....Ciliary body involved.
KNAPP (4th case).....Tumor could not be separated from its attachment to the inner wall of Schlemm's canal.
LEBRUN..... Ciliary body involved.
LIMBOURG.....Ciliary body involved.
MARSHALL.....Tumor in contact with ciliary body.
ST. JOHN.....Ciliary body involved.
SCHIESS (1st case).....Ciliary body involved.
SOLOMON.....Pectinate ligament and ciliary body involved.
THALBERG.....Tumor attached to Descemet's membrane.
WALKER.....Growth attached to Descemet's membrane.
WEBSTER and VAN GIESEN.....Ciliary body involved.
WEDL and BOCK.....Ciliary body involved.
WERTHER.....Schlemm's canal, pectinate ligament and ciliary body involved.
WERTHER.....Schlemm's canal, ciliary muscle and processes involved.
WILLIAMSON.....Ciliary body involved.
SMITH.....Ciliary body involved.
NELSON and THOMPSON.Ciliary body involved.
ROBERTSON.....Ciliary body involved.
ROGMAN.....Ciliary body involved.
SATTLER and KRUCKMANN.....Ciliary body involved.
From Prof. SCHNABEL'S Clinic.....Pectinate ligament involved *in toto*.
SCHULCH and VON GROSZ.Two years after enucleation, recurrence of growth in orbit.
SCHULCH and VON GROSZ.Patient died of metastases.
ROMIÉE.....Cornea involved.
QUAGLINO and GUIATA.Capsule of lens involved.
FANO.....Sclera infiltrated.

LAWFORD and COLLINS. Ciliary body involved.
DENIG..... Ciliary body and processes involved.
FRIEDENWALD..... Ciliary body and sclera involved.
KOMOTO..... Spaces of Fontana and ciliary body involved.

ENUCLEATION (E2).[1]

Histological Examination of the Globe Showed Involvement of Other Parts than Iris.

SCHIESS (2d case, "Fall 4")..... Bulb nearly filled with sarcoma.
VON HIPPEL..... Bulb is filled with tumor.
WHITING..... Involving choroid.
RANDOLPH..... Two years after enucleation death from metastasis.

ENUCLEATION (E3).

Histological Examination of the Globe Showed Possible Limitation of Growth to Iris.

EDSALL..... "So far as I can recall, no invasion of any part of eye except iris." From a letter written four years after the case was recorded.
ROBERTSON and KNAPP. "Removal of the whole iris might have been sufficient in this case."

ENUCLEATION (E4).

Histological Examination of the Globe Showed Limitation of Growth to Iris.

ALT (2d case)..... The whole of the iris involved.
ANDREWS (1st case).... In the stump — after iridectomy — there were cells which looked not unlike the cells of the tumor.
HOSCH..... The tumor has left other parts of the uvea intact.

[1] These cases are put in a class by themselves, because of the fact that, at the time the diagnosis was first made, operation was not allowed, and we, therefore, cannot draw conclusions from them.

ENUCLEATION (E 5).

No Report Concerning Involvement of Other Parts than the Iris.

DRESCHFELD.
PANSIER.....Iridic tissue about the tumor is filled with cells.
SAUER.
SCHNEIDER.
TAY.
COE.
SATTLER, ROBERT.

IRIDECTOMY (I 1).

Histological Examination of Removed Tissue Showsthe Incision for Removal made through Tissue Invaded by Tumor Cells.

AUTHORS' case.
Dr. COLEMAN'S case.
HOTZ'S 1st case.

IRIDECTOMY (I 2).

No After-History, or Indefinite as to Time.

CHARNLEY.....Author was of opinion that tumor would recur.
PFLÜGER.....Reported a few months after operation.
SMITH.....No history of recurrence.
SMITH.....No recurrence.

IRIDECTOMY (I 3).

Case under Observation One Year or Less.

CARTER.....A fresh tumor appeared after iridectomy.
KNAPP (1st case).....Remained under observation about one year; eye free of irritation.
KNAPP (3d case).....Reported three months after operation. "The parts of iris adjacent to tumor were to a certain extent infiltrated with nuclei like those in the tumor."
OEMISCH.....Four months later there was no return of the growth.

VAN DUYSE and VAN SCHWENSTEEN. ....No recurrence three months after operation.

WIEGMAN.....Eight months after iridectomy growth reappeared in scar and was cauterized; at time of closing history there were light brown spots in iris.

ZELLWEGER.....No change in eye, but the patient was well. "It is possible that a metastasis has taken place in the internal organs."

HALE.....Reported four months after operation.

IRIDECTOMY (14).

Case under Observation Two Years or Less.

FICK.....Thirteen months after operation, no recurrence. In this case the pathologist who examined the tissue (Prof. Ribbert) gave an unfavorable prognosis. (Private letter from Prof. Fick.)

HOTZ.....No recurrence after two years.

IRIDECTOMY (15).

Case under Observation Three Years or Less.

KNAPP (2d case).....During the three years since the operation, two very mild attacks of iritis.

PFLÜGER and HORNER..After about three years the eye and general condition showed nothing of interest.

EWETZKY (2d case)....No recurrence after three years. (From private letter.)

THOMPSON, A. H.....No recurrence after two years and two months.

IRIDECTOMY (16).

Case under Observation More than Three Years.

KIPP.....Five years after operation no return. Man was killed in an accident.

KRÜKOW.....In 1884 iridectomy. Reported in 1886 that the patient was seen more than one year after the operation, and showed no return (*Westnik Ophth.*, 1886, i.). In 1895 enucleation; ciliary body and remainder of iris found infiltrated by tumor cells (Ewetzky, *Graefe's Archiv*, xlv., p. 600, Case 8). In 1900 the patient died of general sarcoma—lungs, liver kidney, etc.—as shown by autopsy. (from a letter to the authors from Prof. Krükow).

LITTLE.....A personal letter from Dr. L., January, 1901, says: "In this case there was no recurrence after many years."

MAYWEG.....A personal letter from Dr. M., May, 1901, four years after the operation, says: "To date there has been no return of the growth."

POST.....After eleven years no recurrence (private letter).

VEASEY.....A personal letter from Dr. Veasey, March, 1902, four years after the operation, says: "Not the least sign of recurrence."[1]

To recapitulate, enucleation has been done in fifty-seven cases. Of these, in seven—class E5—we have no data from which to draw conclusions, while four—class E2—are left out for reasons that have been stated. The reader is referred to the notes on the five cases in classes E3 and E4, but the authors would call particular attention to Alt's second case and Hosch's case. The latter stands out very boldy. Eliminating these classes and their sixteen cases, there is left class E1 and *forty-one cases in which the histological examination*

[1] In compiling the tables given above, the authors' attention has been forcibly drawn to the lesson as to treatment to be learned by the histological study of the tissues, and they would respectfully suggest that hereafter, when an eye is removed for iris sarcoma, a very careful description be given of the surrounding parts, particularly of the pectinate ligament, the canal of Schlemm, and the ciliary body; and when an iridectomy is done, note should be made of the presence or absence of tumor cells in the tissues adjacent to the tumor.

of the enucleated globe showed involvement of other parts than the iris.

Iridectomy has been done in twenty-seven cases. The results in the three cases of class I1 can certainly be said to be bad. The notes on the nineteen cases of classes I2, I3, I4, and I5, form interesting reading; in some of them the continued growth of the tumor is only too evident. By way of comment the authors would remind the reader that the growth of these tumors is usually exceedingly slow, warning one not to be too certain of a cure until a long time—more than three years—has elapsed after removal. In class I6 we come to the cases which were followed for more than three years after iridectomy. Little's and Post's cases can be called successes. Kipp's case was probably a success, but, after reading the story of Krükow's patient returning for treatment eleven years after iridectomy, one wishes that Kipp's patient had not been killed, so that further observation could have been made. Mayweg's and Veasey's cases have not been observed long enough to say the last word on them. The case of Krükow needs no comment.

The authors are of the opinion that further remarks on the foregoing findings are not necessary. The facts stand out boldly, they are clear and, as regards treatment, lead only to one conclusion: *When the diagnosis of iris sarcoma is established, the globe containing the growth should be immediately enucleated.*

BIBLIOGRAPHY.

1. ADAMS, JAMES E. On a case of sarcoma of the iris and ciliary body. *Lancet*, April 12, 1879, p. 511.

2. ALT, ADOLF. A case of unpigmented sarcoma of the ciliary body and iris. *Amer. Journ. of Ophthal.*, 1887, 2.

3. ALT, ADOLF. A case of sarcoma of the iris in a child two years old. *Ibid.*, 1890, vii., 42.

4. ANDREWS, JOSEPH A. Primary sarcoma of the iris. *N. Y. Med. Journ.*, June 1, 1889, 595.

5. ANDREWS, JOSEPH A. Primary sarcoma of the iris. *Trans. of the Amer. Ophthal. Soc.*, viii., 533.

6. v. ARLT. Handbuch der gesammten Augenheilk. *Graefe-Saemisch*, iii., 420.

7. BERTHOLD, H. *Arch. f. Ophthal.*, 1869, xv., 159.

8. BUFFUM, J. H. Ocular neoplasms. Melanosarcoma of the iris. *Journ. of Ophthal., Otol., and Laryng.*, i., 35.

9. CARTER, R. B. Sarcomata of both irides. *The Med. Times and Gazette*, 1874, i., 26.

10. CHARNLEY, W. Case of sarcoma of the iris removed by operation. *Ophthal. Review*, 1892, 69.

11. COLLINS, E. TREACHER. Primary sarcoma of the iris. *Royal Lond. Ophthal. Hos. Rep.*, 1888, xii., 273.

12. DRESCHFELD, J. On a case of sarcoma of the iris. *Lancet*, Jan. 16, 1875, p. 82.

13. EDSALL, FRANK H. Primary sarcoma of the iris. *N. Y. Med. News*, Jan., 1897, p. 107.

14. EWETZKY, TH. Melanosarcoma iridis, etc. Ueber Dissemination der Sarkom des Uvealtractus. *Arch. f. Ophth.*, 1896, xlii., 170.

15. EWETZKY, TH. Melanosarcoma Iridis Circumscriptum. *Ibid.*, xlv., 3, 609.

16. FANO. Observation de cancer de l'iris ayant perforé la cornée. Extirpation de l'œil. *L'Union médicale*, 1865, 59, p. 343.

17. FICK, A. *Correspondenzbl. f. Schweizer Aertze*, 1900.

18. FUCHS, E. *Münch. med. Wochenschr.*, 1887, 905.

19. FUCHS, E. *Das Sarcom des Uvealtractus*, Wien, 1882.

20. GALEZOWSKI. Tumeur melanosarcom. de l'iris. *Recueil d'opht.*, 1879, 729–731.

21. GRIFFIN, W. W. A case of leucosarcoma of the iris showing fibrohyaline changes. *Brit. Med. Journ.*, 1900, ii., 1104.

22. GRÓSZ, EMIL. Sarkom der Uvea auf Grund 29 Fälle. *Orvosi Hetil*, 1895.

23. GRUENING, EMIL. Sarcoma of the iris. These ARCHIVES, 1901, xxx., 4, 426. *Trans. Amer. Ophth. Soc.*, 1901, 343.

24. HALE, A. B. Primary sarcoma of the iris. *Medicine*, 1902, 213.

25. v. HASNER. Melanosarcoma Iridis primarium circumscriptum. *Präger med. Wochenschr.*, 1882.

26. HELLEBERG, AXEL. Ein Fall von Iris Tumor. *Nord. med. Archiv*, 1899, x. 15. *Mitteilungen aus der Augenheilklinik des Carolinischen Medico-Chirurg. Instituts zu Stockholm.* Herausgegeben von Dr. J. Widmark, 1899. p. 29.

27. HESS. Rundzellen Sarkom der Iris bei einem Rinde, Extirpation des Bulbus. *Schweizer Archiv f. Tierheilk.*, 26.

28. HIRSCHBERG, J. Ein Fall von Sarcoma Iridis. *Archiv f. Ophth.*, 1868, xiv., 3, 285.

29. HOSCH. Primäres Sarkom der Iris. *Centralbl. f. p. Augenheilk.*, 1881, v., 361; also, *Correspondenzbl. f. Schweizer Aerzte*, 1882, 8, 237.

30. HUBRICH, C. Ein Fall von Melanosarcom der Regenbogenhaut. Reported by title in *Ophth. Klinik*, 1900, No. 20. Cited in *Nagel's Jahresbericht*, 1900, p. 233.

31. KERSCHBAUMER, R. P. Fall 17. Sarcome Iridis mit hæmatogener Pigmentierung. Fall 18. Leukosarcoma Iridis mit Fortsetzung auf das Corpus Ciliare. *Das Sarkom des Auges*, Wiesbaden, 1900, pp. 99 and 101.

32. KERSCHBAUMER, R. P. *Das Sarkom des Auges*, Wiesbaden, 1900.

33. KIPP. A case of primary sarcoma of the iris cured by excision of the tumor. These ARCHIVES, 1876, v., 34.

34. KNAPP, H. *A Treatise on Intraocular Tumors.* New York, 1869.

35. KNAPP, H. Three cases of successful removal of sarcoma of the iris. These ARCHIVES, 1879, viii., 82.

36. KNAPP, H. Sarcoma of the iris. *Phila. Med. and Surg. Rep.*, 1887, lvii., 2, 739.

37. KOMOTO. A case of pigmented sarcoma of the iris. *Nippon Jankasashi*, vol. v., No. 6.

38. KRÜDENER. Sarcom der Iris. *St. Petersburg. med. Wochenschr.*, Jan., 1897, xxii., 391.

39. KRÜKOW, A. Fall von Primaren Melanosarkom der Iris. *Wjestnik Ophth.*, 1886, iv.; and "Fall 7" of Ewetzky, *Graefe's Archiv*, xlv., p. 600; and a private letter to the authors from Prof. Krükow.

40. LAWFORD and COLLINS. Sarcoma of the uveal tract, with notes of 103 cases. Case No. 73. *The Royal Lond. Hos. Rep.*, 1893, xiii., 150.

41. LEBER, TH. Sarcom der Iris, vermüthlich auch des Ciliarkörpers. Report by Freudenthal. *Archiv f. Ophth.*, xxxvii., 1, 148.

42. LEBRUN. Tumeur sarcomateuse de l'iris. Extirpation du Globe. Guérison. *Annales d'oculistique*, lx., 1868, p. 208.

43. LIMBOURG, P. L. A case of leucosarcoma of the iris with iritis serosa. These ARCHIVES, 1890, xix., 239.

44. LITTLE, DAVID. Case of round-celled sarcoma of the iris; successful removal of the tumor. *Trans. Ophth. Soc. of the United King.*, 1883, iii., 28.

45. MARSHALL, C. D. Sarcoma of the iris. *Trans. Ophth. Soc. of the United King.*, 1897, xvii., 30; and *Ophth. Review*, 1897, xvi., 160.

46. MAYWEG, W. Sarcoma der Iris. *Bericht über die 26 Versammlung der Ophth. Gesellschaft*, Heidelberg, 1897, p. 70.

47. NETTLESHIP, E. *Trans. Ophth. Soc. of the United King.*, 1899, xix., 50.

48. OEMISCH. Ueber das Sarkom der Regenbogenhaut. *Inaug. Dissert.*, Halle, 1892; cit. by Pawel, *Arch. f. Ophth.*, 1900, xlix., 71.

49. OWEN, D. C. L. Tumor of the iris. *Brit. Med. Jour.*, 1882, ii., 1156.

50. PANSIER, P. Melanosarcome de l'iris. *Bulletin annuel de la clinique opthalmologique de la Faculté de Médecine de Montpellier*, 1890, 3, 10. [Also a personal letter from Dr. Pansier.]

51. PFLÜGER. Melanosarkom der Iris. Universitäts-Augenklinik in Bern. *Bericht über das Jahr 1883*, p. 20.

52. PFLÜGER and HORNER. A case from the private practice of Professor Horner. Universitäts-Augenklinik in Bern. *Bericht über das Jahr 1883.*

53. QUAGLINO and GUIATA. Contribuzione alla Storia Clinica et Anatomica dei Tumori intra ed extra Oculari. Sarcoma dell' Iride. *Ann. di Ottalm.*, vi., 2, 169–174.

54. v. RECHTPERG, O. K. Ringformiges Sarkom des Iris und des Ciliarkorkörpers. *v. Graefe's Arch.*, 1901, lii., 2, 330.

55. ROBERTSON, A., and KNAPP, H. Sarcoma of iris. ARCH. OF OPHTH., 1873, iii., 2, p. 106.

56. ROBERTSON, WM. Carcinoma involving iris and ciliary body. *Ophth. Review*, 1895, xiv., 374.

57. ROMIÉE. Melanosarcome de l'iris. *Recueil d'ophtalmologie*, 1881, iii., 207–210.

58. ROOSA, D. B. ST. JOHN. Vascular tumor of iris, probably sarcomatous. *Trans. Amer. Ophth. Soc.*, 1869, p. 14.

59. ST. JOHN, S. B. Primary sarcoma of the iris. *Trans. Amer. Ophth. Soc.*, 1897, vii., 532.

60. SAUER. Beiträge zur Casuistik der Iris Sarkom. *Inaug. Dissert.*, Halle, 1882; cit. in *Arch. f. Ophth.*, 1900, xlix., p. 71.

61. SCHIESS, H. Zur Casuistik der Iris Tumoren. *Virchow's Arch.*, 1877, lxix., 100.

62. SCHIESS. Zur Casuistik der Iristumoren Fall IV. *Virchow's Arch.*, 1877, lxix., 104, and Universitätsaugenklinik in Bern. *Bericht über das Jahr 1883*, by Pflüger.

63. SCHNEIDER. Tumor of the iris. *Amer. Jour. of Ophth.*, 1893, x., 385.

64. SOLOMON, J. VOSE. Melanosarcomatous tumor growing from the iris of the right eye. *Trans. Ophth. Soc. of the United King.*, 1882, ii., 257.

65. STÖBER (STRASBURG). De la nature cancéreuse de la melanose de l'œil. *Ann. d'oculistique*, 1853, xxx., 265–267.

66. SZILI, A., Jr. *Arch. f. Ophth.*, 1902, liii., 3, 484. [Personal letter.]

67. TAY, W. Primary cancer of the iris. Slow growth without causing inflammation. *Roy. Lond. Ophth. Hosp. Reports*, 1866, v., 230.

68. THALBERG, J. The pathological anatomy of primary sarcoma of the iris. ARCH. OF OPHTH., 1884, xiii., 179.

69. THOMPSON, A. HUGH. Tumor of the iris. *Trans. Ophth. Soc. of the United King.*, 1899, xix., 49, 52.

70. VAN DUYSE and VAN SCHWENSTEEN. Leucosarcome de l'iris. *Arch. d'opht.*, 1897, xvii., 4, 209.

71. VEASEY, C. A. Primary sarcoma of the iris. *Jour. Amer. Med. Assoc.*, 1898, January, p. 188; *Annals of Ophth.*, 1897, vi., 767.

72. VON HIPPEL, E. Ueber Recidivirende Intraoculare Blutungen bedingt durch einen Tumor. Melanosarcom der Iris. *Arch. f. Ophth.*, xl., 4, 266.

73. WALKER, H. S. Sarcoma of the iris. *Trans. Ophth. Soc. of the United King.*, 1895, xv., 184.

74. WEBSTER, D., and VAN GIESEN, I. A case of sarcoma of the iris. ARCH. OF OPHTH., 1889, xviii., p. 15.

75. WEDL, C., and BOCK, E. *Pathologische Anatomie des Auges*, Wien, 1886. *Neubildungen der Iris*, p. 89.

76. WERTHER, F. Ueber das Sarcom der Iris. *Arch. f. Augenheilk.*, xxxiii., and ARCH. OF OPHTH., xxviii., p. 75.

77. WHITING, FRED. A case of primary sarcoma of the iris with formation of bone in the subsequently involved choroid. ARCH. OF OPHTH., 1890, xix., 4, p. 361.

78. WIEGMAN, E. Ein Fall von Melanosarcom der Iris, Hervorgegangen aus einen Angeborenen Naevus. *Inaug. Dissert.*, Jena, 1893.

79. WILLIAMSON. A case of spindle-cell sarcoma of the iris. *Brit. Med. Jour.*, 1893, 1204.

80. ZELLWEGER. Ein Fall von Leukosarkom der Iris. *Klin. Monatsbl. für Augenhk.*, 1888, xxvi., 366.

SUPPLEMENTARY NOTE.

In the June number of the *Klinische Monatsblätter für Augenheilkunde* (1902, xl., p. 465), which was received after this paper had gone to press, is an article by M. MEYERHOF, entitled **Weitere Untersuchungen an Sarkomen des Ciliarkörpers und der Iris.** In it the writer records a hitherto unpublished case of sarcoma of the iris, numbered as Fall vii. (p. 485), **Primäres melanosarkom der Iris, auf den Ciliarkörpers übergreifend. Ringform. Unterschiede der Pigmentierung.** The microscopical examination of the enucleated globe showed that the cells of the tumor consisted in great part of pigmented spindle and polygonal forms. They had widely invaded the neighboring structures: cells grew on the posterior surface of the cornea and on the anterior capsule of the lens; the pectinate ligament contained tumor cells, as did the ciliary body, and even the choroid and sclera in places.

No clinical history of the case was obtainable.

Author.	Age. Sex.	History.	Condition when First Seen.	Condition at Time of Operation.	Tension.
1. Adams.	13. F.	L. E. A particularly well-grown child. No indications of syphilis.	In deeper layers of cornea are opaque spots, which are exactly like those of "punctate keratitis." Post. synechia below and in. In lower-outer part of A. C. there is a round, brown mass, about size of 2 ordinary pinheads, which are quite smooth on surface. Lower part of tumor concealed in receding angle. No vessels visible on its surface.	The appearance on first examination led to the suspicion that the case was one of unusual form of specific kerato-iritis, and treatment accordingly was followed for several weeks. No improvement. Original mass increased in size; another smaller one close by its side. A few vessels are now visible on surface of large tumor.	
2. Alt.	29. F.	L. E. Failure of vision and pain in eye during four years. Repeated attacks of what is judged to have been iritis. During the last year the eye has been continually inflamed.	V = fingers at 2 feet. Great pain; double injection; iris discolored; pupil small and irregular and is filled by an iritic membrane; iris attached to the lens. In the angle in the middle of the lower quadrant there is a minute dark spot, which is just raised above the level of the surrounding tissue.	The tumor was taken for a gumma, and vigorous antisyphilitic treatment was given. The inflammatory symptoms subsided, but the tumor remained unchanged. Six weeks later the inflammation returned accompanied by pain and increased tension.	
3. Alt.	2 F.	R. E. Parents healthy.	Slight double injection; pupil very small and the iris is attached to cataractous lens. Iris nodular and swollen. There are a number of nodules; two are especially large. No swollen glands. L. E. normal.	During three weeks was treated with mercury and atropine, which had no influence. The swelling of the iris increased; more injection. Two staphylomatous elevations of sclera in ciliary region.	+1
4. Andrews.	47. F.	L. E. Discoloration at site of tumor has been noticed for at least 5 or 6 years. About 15 mos. ago sight of left eye became obscured, condition lasting a day or two. Periodical obscurations of vision frequently since then.	Slight double injection. Pupil dilates under atropine. No corneal opacity. Lens, vitreous, and fundus normal. Growth appears to spring from anterior aspect of iris. It is lobulated and vascular.		
5. Andrews.	43. F.	Growth had been noticed for a long time.	Circumcorneal injection; no pain.		
8. Buffum.	55. F.	R. E. Eight years ago noticed peculiar appearance of the eye. During this time there have been occasional attacks of pain and inflammation; these attacks have increased in frequency. Vision has been less after each attack until sight disappeared. Last attack 3 weeks ago, and since then pain has continued.	Double injection. Pupil irregular. Lower portion of iris gray; upper part, which seems almost in contact with the posterior surface of the cornea, is brown, with dark spots upon its surface. Lens hazy and fundus cannot be seen. Pain around the eye.		+1.
9. Carter.	15 M.	Both eyes. Healthy lad, of good family history. Three weeks before admission to hospital he noticed a small speck on the iris of left eye, which steadily increased in size. Two weeks before admission two similar specks appeared in the right eye and also increased in size.	In left iris, lower portion, there is a tumor the size and color of a split pea, extending to the margin of A. C., and encroaching upon the pupil and lying in contact with inner surface of the cornea. Tumor is covered by fine network of blood-vessels. The rest of iris appeared healthy. Zone of fine injection around cornea. In the right eye were two small growths of similar character, springing from the outer part of the margin of iris, but the eye was in other respects healthy and the vision was unaffected.		

Vision.	Primary Position of Tumor.	Operation.	Microscopical Examination of Iris and Globe if Enucleated.	Remarks on Treatment —Later History of Case
		Enucleation.	Round-celled sarcoma; attachments to cornea and secondary deposits in ciliary muscle.	"Some of my colleagues advised attempts at removal by iridectomy. But feeling confident of my diagnosis and remembering the case of Carter, I adhered to my own opinion and enucleated. Microscopical examination showed that any attempt to save the eye would have been worse than useless."
	Lower quadrant.	Iridectomy. Enucleation.	Unpigmented spindle-celled sarcoma.	It was impossible to remove the tumor because of its peripheral position. The tumor grew and the eye was removed. The iris tumor was in connection with a larger one in the ciliary body.
		Enucleation.	Round-celled sarcoma, which involved the whole of the iris. Origin probably in loose parenchymatous tissue of the membrane.	
$\frac{10}{100}$		Iridectomy. One week later enucleation.	In the stump of the iris in the globe there is an infiltration of cells, which look not unlike the cells near the tumor in that part of the iris, which was removed by iridectomy.	After the iridectomy there was considerable inflammatory reaction. The author claims that the tumor was entirely removed by the iridectomy.
Not disturbed.		Enucleation.	Because of the extension of the sarcoma beyond the reach of an iridectomy, any attempt at excision by iridectomy would have failed.	"It is impossible to determine in a given case whether the ciliary body is involved."
0.	Upper $\frac{1}{3}$ of iris.	Iridectomy when fully $\frac{1}{4}$ of the iris was removed. Three months later enucleation.	Microscopical examination of excised iris showed pigmented spindle-celled sarcoma. Examination of globe showed it to be nearly filled with sarcoma cells.	The enucleation was done because of renewed inflammatory attacks. Patient died 18 months later; diagnosis of pneumonia, but there was no post-mortem examination.
		Iridectomy on left.	Round-celled sarcoma.	After operation on left eye a fresh tumor appeared at outer margin of iris.

Author.	Age. Sex.	History.	Condition when First Seen.	Condition at Time of Operation.	Tension.
10. Charnley.	16. M.	R. E. Eleven years ago consulted an oculist about the growth. For many years after the tumor remained unchanged; lately red spots appeared on it, and there has been occasional obscuration of sight. General health good; family history negative.	There was a small hemispherical tumor about $\frac{3}{16}$ inch in diameter. Iris gray. The tumor projects well from its surface and it is brownish-gray in color; it is vascular. Iris movable; fundus normal.	Eighteen months later dimness of sight. Tumor has certainly increased in size. There is an effusion of blood in A. C., occurring without shock or blow.	
11. Collins.	21. M.	L. E. First noted trouble 3 years ago; since then tumor has gradually increased in size. Formerly the iris was blue; it has become more of a green color. "He has never had any inflammation in the eye, nor has he at any time received any injury to it." Vision always good. A photograph taken $4\frac{1}{2}$ years ago shows a dark spot down and out on iris.	Some ciliary injection. Cornea clear; pupil active, but shows some irregularities in its margin. Iris greenish. Down and in at the pupillary margin there is a rounded brown projection. Lens clear; fundus normal.	Five days after first examination the eye was removed.	
12. Dreschfeld.	53 F.	L. E. Subject of rheumatism and always of indifferent health.	There was a hemorrhage into A. C.; otherwise the eye was normal. After two weeks, seen again, when the blood was absorbed. Fundus healthy. Vision good.	Three years later was seen again with history of three attacks of hemorrhage into A. C. On close examination tumor was found, which was size of a split-pea and reddish-gray in color. Eye painful.	
13. Edsall.	23. F.	L. E. Two years ago noticed growth in iris. Tumor has increased in size, and for several months there have been attacks of pain. General health good; personal history negative.	Tumor about the size of a split-pea. Dark gray in color. Frequent hemorrhages have occurred into A. C.	Diagnosis of sarcoma, but the possibility of gumma suggested the short use of mercury and K. I., which was without results. The tumor possibly increased in size.	+
14. Ewetzky.	38. M.	L. E. Acquired syphilis two years ago. For two weeks has complained of pain in left eye.	Slight pericorneal injection. Back of the cornea there is a tumor, which bears on the lens and pushes the iris forward to the cornea. V = $\frac{1}{6}\frac{0}{0}$ T. n. Put on specific treatment, but no change. Fifteen months later tumor has become larger. V = fingers at ten feet. T. n. Patient was told that enucleation was necessary when he disappeared.	Three years later the tumor has become still larger. On the upper border of the cornea in the sclera, under the conjunctiva, there are two miliary spots. V = o. T +.	
15. Ewetzky.	28. M.	R. E. Nine years ago a bright yellow spot was noticed where tumor now is. Four or five years later a black spot appeared in the middle of the yellow spot and began to grow, and from this the tumor has developed. Lately the tumor has grown rapidly.	Tumor is the size of a bean and occupies the entire breadth of the iris and projects over the pupillary border. The tumor extends forward to the cornea; it is dark brown in color. Pupil reacts; it is irregular. Fundus normal. No inflammatory symptoms; no pain.		Normal
16. Fano.	19 M.	Has had trouble for three months; no cause given.	Ocular conj. moderately injected. A tumor in upper-inner portion of cornea, size of a lentil and reddish-white in color. A portion of the tumor was excised.	One month later the eye was excised.	
21. Griffin.	19. F.	L. E. Failure of vision dated back only 3 weeks. No history of injury.	The tumor pushed the iris against the cornea. As seen through the pupil the tumor appeared white and opaque, and its surface was slightly irregular. Pupil mobile and reacted to light. No pain or signs of inflammation.		Not increased

Vision.	Primary Position of Tumor.	Operation.	Microscopical Examination of Iris and Globe if Enucleated.	Remarks on Treatment-Later History of Case
$\frac{6}{9}$	Lower-inner quadrant.	Iridectomy.	It has much the appearance of ordinary spindle-celled sarcoma; there is yet a difference, for in many places there is fairly developed fibrous tissue. There are blood-vessels with imperfectly developed walls.	"Is the tumor likely to recur? One would say it almost certainly would."
$\frac{6}{9}$	Outer-lower part.	Enucleation.	On the anterior surface of iris a layer of closely packed, small round cells, with very little intercellular substance. These cells invade the cornea, and are in and around the canal of Schlemm and also lie on posterior surface of Descemet's membrane. Some spindle cells. Ciliary muscle and processes are infiltrated with groups of round and spindle cells. The tumor is pigmented in patches.	
Dim		Enucleation.	Spindle-celled melanotic sarcoma.	Dr. D. Little of Manchester, England, in whose practice this case occurred writes: "January, 1901 Dr. D. L. saw this patient fifteen years after the operation, and there was no recurrence."
$\frac{10}{10}$	Temporal side midway between scleral and pupillary border.	Enucleation.	Small spindle-celled sarcoma.	A letter written in 1901 says: "So far as I can recall, there was no invasion of any portion of eye except iris."
		Enucleation	Pigmented, round- and spindle-celled sarcoma; secondarily in ciliary body.	
	Upper-inner quadrant.	Iridectomy by Prof. Krûkow.	Tumor consists principally of small round cells, with some spindle cells. Many cells are pigmented.	A letter from Prof. Krûkow says: "No return of growth at least up to date of report, August, 1901."
P. l.		Enucleation.	Tumor mass contained connective-tissue cells, some in process of formation. Some of the cells were pigmented. Sclera infiltrated.	No return after six months.
Fingers at two metres.	Lower-outer quadrant.	Enucleation.	The growth arose in the posterior layers of the iris. Ciliary body was involved. Small spindle-celled sarcoma traversed by numerous irregular bands of hyaline or myxomatous degeneration.	

Author.	Age. Sex.	History.	Condition when First Seen.	Condition at Time of Operation.	Tension.
23. Gruening.	11. M.	L. E. According to mother the spot had been noticed for four weeks.	A reddish-yellow mass growing from iris. This mass composed of three yellow nodules, which sprang from a common red base. Pupil dilated; atropine. Slight double injection. Media transparent. Fundus normal. In order to establish the nature of the growth, enough of the tissue was removed to examine microscopically.	After the iridectomy the wound did not close, the mass became visibly larger. Enucleation.	
24. Hale.	23. F.	R. E. The patient was well nourished and healthy; no history of syphilis or tuberculosis. For 3 weeks the eye had been painful.	A small tumor was visible within the iris. The iris was freely movable. Under atropine the tumor became more prominent. Large doses of potassium iodide were given for three days, with no effect.	Just four weeks after pain had begun, the tumor as a whole was withdrawn, through a corneal incision and excised. Healing normal.	
26. Helleberg.	49. M.	R. E. About five years before appearance had a blow on the eye; following this the vision decreased and the eye was inflamed, which disappeared in a few weeks and the vision returned to normal. Vision remained normal until eight months ago when it was noticed that the right eye did not see as well as the left. Six months ago the vision became so poor that he could only recognize objects near the eye. Pain in the eye drove the patient to the clinic three months ago.	Below and on outer side the iris was pressed forward and in this region there were fine vessels. Between the iris and lens there was a tongue-like pigmented formation. T. was increased. Papilla totally excavated. V = fingers at $\frac{1}{2}$ metre. Patient refused enucleation.	After three months came again to clinic and requested enucleation. The eye was practically blind and there was pain in the eye and head. Slight double injection, cornea transparent. Pupil did not react to light.	+
28. Hirschberg.	38. M.	R. E. Patient had always been well. During a year has noticed a black new-formation in the iris. This began on a place where from youth there had been a dark spot. During the last weeks the increase in size has been particularly rapid. General health good.	The growth is not accompanied by pain, redness, or other inflammatory symptoms. The A. C. is in great part filled by a dark mass, which grows from the iris, and which in color is dark brown. The part of iris free of tumor appears normal.		
29. Hosch.	66. M.	R. E. In the iris of this eye there had been a brown spot since youth. Recently this eye has had a feeling as if there were a foreign substance in it.	T. normal. V. = $\frac{1}{36}$. Conjunctival injection below. A brown tumor in lower part of A. C., which pushes iris backwards. The tumor reaches the middle of the pupil. Media clear. Advised enucleation and the patient laughed.	Six months later returned complaining of pain and that the eye was always red. Pericorneal injection. The tumor is larger and shows numerous vessels.	Normal.
30. Hubrich.	54.	L. E. The growth might have sprung from a pigmented nævus.	In the iris there is a black tumor; in other portions of the iris there are other black spots. In the sclera there are two irregular black masses in the outer-lower portion.		

Vision.	Primary Position of Tumor.	Operation.	Microscopical Examination of Iris and Globe if Enucleated.	Remarks on Treatment—Later History of Case.
Normal.	Below.	Iridectomy for diagnosis. Enucleation.	By Dr. Geo. S. Dixon. Sarcoma of round- and spindle-cell variety. Ciliary body involved.	
	Outer-lower quadrant.	Iridectomy.	Melano-sarcoma.	Four months after iridectomy patient was last seen, when there was no pain, the iris was freely movable, the coloboma was clear, and there were no traces of tumor.
0.	Below and temporal side.	Enucleation.	The tumor in cross-section extended from pupillary edge nearly to the ciliary body. It had its origin in the posterior layers of the iris. The ciliary body was invaded. The author says that the tumor is to be classed as an unpigmented tumor; it contained some pigment cells, but he considered these as preformed iris pigment cells.	
$\frac{2}{3}$	Lower half of iris.	Enucleation.	Pigmented spindle-celled sarcoma. Tumor was adherent to the lens.	Six months after the operation, patient presented himself to "express his thanks at being cured."
$\frac{16}{100}$		Enucleation.	Pigmented spindle-celled sarcoma springing from iris; other parts of uvea intact.	
	Lower-inner quadrant.	Enucleation.	Melanotic spindle-celled sarcoma. The sarcoma cells have infiltrated the lamellæ of the cornea at the limbus. Canal of Schlemm destroyed.	

Author.	Age. Sex.	History.	Condition when First Seen.	Condition at Time of Operation.	Tension.
31. Kerschbaumer.		No clinical history.			
31. Kerschbaumer.	36. M.	L. E. About three years before examination the patient noticed a dark spot in the iris; at that time it was about the size of a millet seed. Since then it has grown rapidly.			
33. Kipp.	36. M.	R. E. Always good health. No history of injury or syphilis. Twelve years ago first noticed a reddish nodule about the size of a pinhead in the lower pupillary margin of the iris. It gave no trouble and no attention was paid to it. The increase in size was very slow, until one month ago. In one month this spot has grown more than it did in the twelve years preceding. During the last few weeks there has been a gradual loss of sight and occasionally pain.	Conjunctiva, sclera, cornea, retina, choroid, lens, and vitreous normal. The A. C. is of normal dimensions but partly filled by a flesh-colored growth, measuring 7 *mm* × 5 *mm* × 4 *mm*. The tumor is nodular. Iris where not attacked appears normal.		Normal.
35. Knapp.	36. M.		No symptoms of irritation. Tumor occupied fully ½ of iris; it was white and slightly vascular.		
35. Knapp.	35. F.	The tumor had existed for many years and had grown very slowly.	The tumor was of the size of a small pea.		Increased
35. Knapp.	22. M.	L. E. Ten years ago a small speck was noticed in the left eye. No inconvenience until four years ago, when from time to time there was a veil-like obscuration of the vision.	The tumor is yellowish-red in color and projects into the A. C. It is studded with numerous red dots and small lines. It is not quite as large as a small strawberry.	One month later the tumor was removed.	Normal.
36. Knapp.	53. F.	"Three and a half years ago she had a fibrous tumor removed from the lobule of the left ear. This tumor recurred and was removed one year since. There has been no relapse noticeable so far." Four months before examination impaired vision was noticed and a small tumor developed in the iris and encroached in the pupil. The tumor has increased in size rather rapidly, and the eye at times is painful and congested.	Eye free from irritation. The tumor was the size of a cherry-stone and extended over the adjacent ⅓ of the pupil. Pupil is adherent to the capsule. Lens is cataractous. No pain.		Normal.

Vision.	Primary Position of Tumor.	Operation.	Microscopical Examination of Iris and Globe if Enucleated.	Remarks on Treatment—Later History of Case.
	Lower part of A. C.		The tumor filled nearly $\frac{3}{4}$ of A. C. It was attached to the posterior layer of the iris, and was so intimately connected with the posterior pigment layer that they could not be separated. The iris in places was free from tumor, and it showed wide-gaping, numerous vessels and blood extravasations. The neoplasm filled the posterior chamber and dislocated the ciliary processes; these, as also the ciliary body, were free from the tumor. The canal of Schlemm and the ligamentum pectinatum were invaded by the tumor cells.	
	Inner side.		Tumor takes up $\frac{3}{4}$ of A. C. The tumor cells are partly round, partly polygonal, and there are a few bundles of spindle cells. The tumor shows itself as a slow-growing neoplasm. There are no retrograde changes. The pigment-bearing cells are located in the neighborhood of the blood-vessels.	
$\frac{20}{20}$	Lower pupillary margin.	Iridectomy.	"White" spindle-celled sarcoma. Pigment present in small quantities.	In a letter, dated Dec. 10, 1900, Dr. K. writes: "The man lived for five years after the operation, and at the time of his death, due to injuries sustained in a railroad collision, the eye was apparently free from disease."
$\frac{20}{70}$		Iridectomy.	Tumor originated in the stroma of the iris and consisted of white spindle cells.	After operation V=$\frac{20}{100}$. Patient remained under observation for about one year, and the eye was free from irritation.
$\frac{20}{100}$	Lower part of iris	Iridectomy.	Melanotic spindle-celled sarcoma, growing from the stroma of the iris.	In the three years following the operation there were two mild attacks of iritis.
Normal.	Outer-lower portion.	Iridectomy.	Sarcoma. "The parts of the iris adjacent to the tumor were to a certain extent infiltrated with nuclei like those in the tumor."	The case was reported three months after iridectomy.
P. L.	Out and up.	Enucleation.	The tumor proved to be larger than was anticipated; it was elliptical and 5 x 8 *mm* in size. It could be separated from the surrounding structures except at the ciliary margin, where it was attached to the inner wall of Schlemm's canal.	

Author.	Age. Sex.	History.	Condition when First Seen.	Condition at Time of Operation.	Tension.	Vis
39. Krükow.	25. F.	R. E. For seven years the patient had noticed a black spot on the iris in the place where the tumor developed.	Patient was first examined in 1881, when a slightly prominent spot was present in the iris It was dark brown in color. In July, 1884, there was a hemorrhage into the A. C., which was absorbed in a few days.	In November, 1884, the tumor showed itself as noticeably larger; it filled ¼ A. C., and covered half of the pupil. Vision unchanged.	Normal.	½
40. Lawford and Collins.	21. M.	Family history negative. Spot has been noticed on iris for three years.	The growth involves the entire width of the iris.		+	
42. Lebrun.	36. F.	L. E. For previous three months noticed gradual failure of V in the eye, and during the week before the examination, that the eye was red. Patient has always been fairly well. No trace of syphilis, although she is of strumous diathesis and has a small goitre.	At the inner sclero-corneal border of the iris, in the transverse diameter, is a small, reddish-brown elevation, like a radish seed, and not unlike an iridic condyloma. Slight injection of the scleral vessels towards the inner canthus.	Ten days after admission to the hospital the tumor enlarged to twice its original size, the pupil began to dilate, and the cornea, hitherto clear, showed signs of opacity. In two weeks it presented the appearance of a punctate keratitis, and the new growth had invaded the whole width of the iris. Pericorneal congestion, severe pain in and about the eye.	+	
43. Limbourg.	7½. F.	Was admitted to clinic on account of partial loss of sight.	Slight episcleral injection. Deposits on posterior surface of cornea. A. C increased in depth. New growth has yellowish color and extends to the cornea. Tortuous vessels at upper margin of tumor. Pupil when enlarged by atropine is obliquely oval. Deeper portion of eye cannot be examined.		+ 1.	Fin
44. Little.	20. F.	L. E. Sixteen months ago, while in act of stooping, L. E. became suddenly blind and remained so for nearly a week. On recovering sight observed for first time spot on colored part of eye. During these sixteen months there have been three or four attacks of dimness of vision at irregular intervals. Always good health. No suspicion of syphilis. Family history good.	A pale brownish mass, the size of a small pea, on iris, extending from pupillary margin to periphery. It is somewhat irregular in shape, and portions of it are in contact with cornea. Surface presents blood-vessels and numerous red points. Eye free from irritation, fundus normal. "I had no doubt at the time the growth was sarcomatous, but as there appeared to be nothing urgent in the case, I decided to watch it for a time."	Four months after first seen tumor had visibly increased, particularly towards peripheral region; in all other respects eye was same as when first seen.		N
45. Marshall.	21. M.	R. E. Both eyes were equally good until three years ago. Since then the right eye has been bloodshot and has failed gradually, but without pain. The day before admission eye became acutely painful and remaining sight has disappeared.	Cornea hazy; A. C. almost obliterated; iris bulged forwards. An iridectomy was performed and then a large, opaque mass, looking like the lens, presented. It was found impossible to remove this. The eye was then excised.	(A white mass occupied the centre of the pupil, simulating opaque, swollen lens matter. While operating for relief of supposed cataract the real nature of the condition became apparent and the eye was excised. This history was given by Lawford, who removed the globe.)	+ 2	

Vision.	Primary Position of Tumor.	Operation.	Microscopical Examination of Iris and Globe if Enucleated.	Remarks on Treatment—Later History of Case.
$\frac{18}{20}$	Outer-upper quadrant.	Iridectomy.	Round- and spindle-celled melanosarcoma.	When the case was first reported, a note was made that the patient was seen more than a year after the operation, when no return of the growth was visible. Eleven years after the iridectomy this patient consulted Prof. Ewetzky, complaining of eye symptoms; he removed the eye and histological examination showed the ciliary body to be infiltrated with spindle-celled sarcoma. The choroid was not attacked (*Graefe's Arch.*, xlv., p. 600). In 1900, nearly twenty years after this patient first consulted Prof. Krükow, "he died of general sarcoma—lungs, liver, kidneys, etc." (from a letter from Prof. Krükow to the authors).
$\frac{4}{8}$	Lower-inner quadrant.	Enucleation.	Pigmented, round, and spindle-celled sarcoma. Ciliary body involved.	Patient alive and well three and a half years after operation.
	Inner aspect of iris to which at first it was confined.	Large iridectomy including all the tumor. Two weeks later enucleation.	The tumor mass is made up of imperfectly formed connective-tissue, especially towards the point of attachment, infiltrated with numerous round and spindle cells, forming a neoplasm, evidently of recent and rapid growth. Ciliary body and root of iris also involved; the former contains a growth the size of half a pea.	The first operation was followed by sharp reaction, all the symptoms being aggravated, so that in two weeks more the eye was enucleated.
Fingers at' 1 *m.*	Upper-inner quadrant.	Enucleation.	Non-pigmented sarcoma formed of spindle cells, between which were a few small round cells. Tumor involved the adjoining portions of the ciliary body. The greater portion of the iris, which seemed normal, was also found to contain numerous areas of tumor growth.	
Normal.	Outer-lower quadrant.	Iridectomy.	Microscopical examination by Dr. Dreschfeld. Mass composed entirely of round cells. Pigmented round-celled sarcoma.	Four weeks after iridectomy, V= $\frac{18}{18}$. Two years after operation there was no evidence of recurrence and the sight was normal. January, 1901, in a personal note to us, Dr. Little says: "In this case there was no recurrence after many years."
		Iridectomy, then enucleation.	Small, round, and spindle-celled sarcoma. Unpigmented. The tumor is in contact with the ciliary body and occupies the position of the lens.	

Author.	Age. Sex.	History.	Condition when First Seen.	Condition at Time of Operation.	Tension
46 Mayweg.	53. M.	L. E. Sixteen years ago noticed a yellowish-brown spot in the iris, which gave no trouble until about half a year ago. Recently the tumor has changed gradually.	A small, yellowish-brown tumor occupies ⅓ of iris. Pupil reacts to light and atropine; there are pigment spots on lens capsule.	Operation two months later	
48 Oemisch.	42. F.	R. E. Family history good; health excellent. Five years ago noticed a dark-brown spot on iris of right eye. During three years it grew very little and caused no pain. Two years ago had a sudden loss of vision; but following day vision became normal. During next year had hemorrhages into A. C. One year ago tumor began to grow and eye became nearly blind and painful. Patient had intense headache.	No local injection or other phenomena due to irritation; only a few vessels of conj. were enlarged. In A. C. a dark, gray-blue tumor located behind iris. It occupies nearly a complete quadrant of the iris; it has the size of a small pea. Fundus normal. A few large vessels are seen on tumor. The pupil dilates under atropine; except in the region of iris occupied by tumor, is adherent to ant. caps. The day following the first examination the whole of the tumor was enclosed in a hemorrhagic exudate which came overnight and caused great pain.	The tumor was removed by iridectomy seven days later.	Normal
50. Pansier	38. M.	L. E. About middle of September, 1889, a black spot was noticed on the iris of left eye. Vision was affected, but no pain.	November, 1889, tumor 3 *mm* in diameter and about 5 *mm* high.		
51. Pflüger.	55. F.	R. E. Patient noticed in iris six years ago a dark spot which has grown gradually. The patient's mother died of a tumor which arose in the naso-orbital region.	Cornea normal. Tumor 3 *mm* wide × 0.5 to 1.0 high, and of dark brown color. The peripheral border reaches the angle of the A. C. Above this tumor is a small second tumor. The iris dilates under mydriatic, showing posterior synechiæ and opacities of the capsule. Fundus normal V. *u. o.* $\frac{20}{15}$.		
36. Pflüger and Horner.	36. F.	L. E. Consulted Prof. Horner because of a small black spot, which had been noticed more than ten years, but which recently has grown greatly.	3. V. 1881. Eye white. Pupil is oval. A three-cornered brown spot reaches from the edge of the pupil to the angle of the A. C., which includes about ⅓ of the iris.		
53. Quaglino and Guiata.	6. M.	A healthy child. Eye trouble three months' duration. Came on slowly without pain or irritation.	A. C. filled in lower ⅔ by a reddish-yellow mass, on upper surface of which are blood-vessels.		+
55. Robertson and Knapp.	24. F.	R. E. Good health and noticed nothing peculiar till fourteen months ago, when the eye was slightly inflamed. Unattended by pain and only of short duration. Six months later had severe pain in right eyebrow, with dimness of vision. Six months ago found vision very dim, also pupil dilated. During last two months has also suffered from pain in eye.	Right pupil is dilated and reacts sluggishly to light; at its upper and outer ciliary margin there is a light-brown tumor about 1‴ in length and ½‴ in breadth. Tension markedly increased. Refused operation.	Two months later: Left eye normal. Right eye: iris somewhat darker than left. Pupil 3½‴ in diameter. In the iris is an oval brownish tumor, measuring 1½‴ × 1‴ and extending downwards. At the ciliary margin there is a chain of three similar tumors of very small size. A plexus of subconj. veins extends from near the margin of cornea towards the periphery. V = P L (?); T + 2. Glaucomatous cupping; otherwise fundus healthy. No tenderness on pressure. Diagnosis from increase in size of tumor and development of new growths; sarcoma.	

Vision.	Primary Position of Tumor.	Operation	Microscopical Examination of Iris and Globe if Enucleated.	Remarks on Treatment—Later History of Case.
$\frac{10}{10}$	Up and out.	Iridectomy.	Melanotic, spindle-, and round-celled sarcoma.	Under date of May 1, 1901, a private letter to the authors from Dr. Mayweg says that there has been no recurrence of the growth up to that time.
$\frac{6}{9}$	Lower inferior quadrant.	Iridectomy.	Spindle-celled leucosarcoma.	Four months later, when patient was seen, there was no return.
$\frac{1}{2}$	Inner aspect of iris.	Attempt at iridectomy. Four days later enucleation.	Pigmented small spindle-celled sarcoma. The iridic tissue about the tumor is filled with cells.	
	Out and down.	Iridectomy.	Pigmented spindle-celled sarcoma.	The case was reported a few months after the operation.
V= 1.		Iridectomy.	Sarcoma.	In 1884 the eye and the general condition showed nothing of interest.
	A larger tumor is below; a smaller one above.	Enucleation.	Pigmented lympho-sarcoma, composed of small cells. Capsule of lens involved.	
Fingers close to eye.	Upper-outer part of iris.	Enucleation.	Melanotic sarcoma of the iris, developing from the anterior layer of the iris. Removal of the whole iris might have been sufficient in this case, yet this could not have been determined prior to the enucleation, which operation was so much the more justifiable as the eye had already been blind.	Two years after operation patient was in good health and there was no return of the disease.

Author.	Age. Sex.	History.	Condition when First Seen.	Condition at Time of Operation.	Tension.
58. Romiée.	74. F.	R. E. For some time intense pain in eye, radiating over forehead and temple. For forty years has had no vision in the eye and an excrescence at the inner part of the cornea.	An irregular tumor occupies the entire front of the globe, projecting forward more than one *cm.*	Removed eye four days later.	
59. St. John.	50. M.	L. E. Had noticed a black spot upon the iris for about one year. When first seen it was of size of a large pin-head. No pain or other subjective symptom until loss of vision was noticed three months ago.	A large brown mass in A. C., nearly filling that space and pushing iris back.	Enucleation one week after first examination.	Normal.
60. Sauer.	7. F.	A red tumor on the iris has existed four months. Since four weeks it is extra-bulbar at the nasal corneo-scleral border.	Nearly fills the A. C.	A tumor, size of a bean, of a grayish-yellow color, extends between the lids. Cornea flat and opaque.	Minus.
61. Schiess.	55. F.	R. E. During seven weeks has been troubled in reading.	A dislocation of the iris has been brought about by a tumor situated in the posterior chamber below. In the sclera near the limbus there are 7 large and small brown, flat spots. To one of the larger of these there goes a thickened ciliary vessel. No inflammatory symptoms.		
62. Schiess.	47. F.	L. E. Has noticed a black spot in the eye for at least 30 years, which has never caused pain.	28, II., 1874. For three weeks smokiness before the eye; fine work is not possible. The tumor increases in size. Pupil relatively wide, drawn towards the tumor. The tumor extends nearly to the cornea and presses the lens backwards. V = 1. 21, III., 1874. Secondary glaucoma, cornea steamy. Ciliary injection. V = $\frac{1}{8}$. Enucleation advised. 11, VI., 1874. V = $\frac{8}{180}$. Ball hard as stone. 29, VIII., 1874. Pupil wider, cornea more opaque, tumor increasing in size.	4, VI., 1879. Since middle of March eye inflamed and painful. V = 0. The tumor has perforated the sclera. 10, VI., 1879. Enucleation.	
63. Schneider.	16. F.	L. E. Eleven years ago the left eye was injured with a fork; five months later the parents noticed a small brown spot near the pupil. This spot did not change until four years ago, when from no apparent cause it assumed a flesh color and began to increase in size.	R. E. normal. L. E. V = fingers 10 ft. No pain, no inflammatory symptoms. A. C. filled with blood. Externally cornea normal, but the lower temp. quadrant of internal layers are hazy. T increased. After 10 days the blood was absorbed, V = $\frac{3}{36}$, and a tumor of the iris was visible, reddish-yellow in color, shaped like a coffee bean. It appeared very vascular; 9 *mm* × 5 *mm.* Pupil reacted to light. Fundus normal. Patient disappeared.	One year later patient returned with dull pain in eye, photophobia. The tumor had grown in all directions. T increased. Cornea hazy. V = less than $\frac{1}{4}$; optic symptoms of pressure atrophy. "A solid, flesh-colored tumor, very vascular."	

Vision.	Primary Position of Tumor.	Operation.	Microscopical Examination of Iris and Globe if Enucleated.	Remarks on Treatment—Later History of Case.
		Enucleation.	Sclera normal. Retina somewhat raised by a sero-sanguineous fluid; optic nerve normal. Crystalline lens intact. Choroid and ciliary body œdematous. Iris is seen only at the extreme lower margin; most of it has been replaced by tumor which fills A. C.; ⅔ of cornea has been destroyed. The tumor is formed of small round cells and is melanotic.	
$\frac{6}{100}$		Enucleation.	Melanosarcoma involving ciliary body.	
0.	Nasal side of iris.	Enucleation.	Pigmented sarcoma with thin walled vessels.	After sixteen years reported to be in sound health.
$\frac{20}{100}$		Enucleation.	Melanosarcoma.	
	Lower-inner quadrant.		The ball was nearly filled with a melanotic sarcoma.	21, VI., 1879. A melanotic axillary gland (Achseldrüse), size of two cherry seeds, was removed. Six weeks later there was swelling of the liver. June, 1881. The woman is still alive.
	Lower temporal quadrant of iris.	Enucleation.	Found a connective tissue "and epithelial growth apparently from the iris."	The diagnosis is made of "Papilloma originating from the sub-epithelial connective tissue of the iris."

Author.	Age. Sex.	History.	Condition when First Seen.	Condition at Time of Operation.	Tension.
64. Solomon.	43. F.	R. E. Twenty years ago first noticed a small speck, size of pin-head, at the outer and ciliary margin of right iris. Since then the tumor has gradually increased in size, growing towards the pupillary margin of the iris, which it now slightly overlaps. Lately the patient has suffered from occasional darting pains in the eye.	The tumor is brown in color and non-transparent. External surface of eye is normal. Cornea clear. A. C. shallow. Iris and pupil generally discolored. Lens clear. Vitreous cloudy. "On the anterior surface of the iris as viewed through the cornea there is a small black, elevated mass, about 2 *mm* in width, extending from the pupillary margin apparently to the base of the iris."	Operation three days after admission to hospital.	Normal
67. Tay.	25. M.	L. E. So long as ten years ago there was something so remarkable in the appearance of the eye that it attracted the attention of the house surgeon of the hospital. At the time suffered no inconvenience. No inflammation at any time. Tumor has grown slowly.	Grayish jelly-like mass, with opaque points through it, and abundantly supplied with minute blood-vessels.		
68. Thalberg.	64. F.	R. E. Both eyes had been operated on for cataract, and since the operation she complained of constant pain right temporal region.	Right eye irido-cyclitis, deep episcleral injection, ciliary neuralgia, tenderness on pressure. This condition was relieved by ordinary treatment of irido-cyclitis. Patient discharged. Returned in two months suffering as before; condition was again relieved. Returned as before with similar condition several times. Finally, at patient's request, eye was removed because of pain and V = 0.		
69. Thompson.	51. M.	R. E. Patient came to Moorfields, October, 1898, complaining of bad sight. Gave no history of tumor and did not even know of its existence. The bad sight was due to tobacco, and has improved from $\frac{6}{24}$ in R and $\frac{6}{18}$ in L to $\frac{6}{6}$ in each eye.	Tumor is a cauliflower-like projection of a light brown color, measuring about 3 *mm* × 4 *mm*. It overlaps the pupillary border and causes eversion of the uvea. Dark brown lines run over its surface, but no vessels are visible. There has been no congestion or pain. Pupil reacts normally, except where it is pulled on by tumor. Fundus normal.	Tumor was removed 2½ months after first examination.	Normal.
70. Van Duyse and Van Schwensteen.	67. M.	L. E. Patient in good general health. The tumor is of one month's standing; it grew gradually and was accompanied by pain.	A tumor in the A. C. growing from iris and extending to the posterior surface of the cornea. It resembles an oval bean. The tumor is crossed by vessels. The portion of iris not affected by tumor is normal. No pericorneal injection. Vision good until within one month.		+1

Vision.	Primary Position of Tumor.	Operation.	Microscopical Examination of Iris and Globe if Enucleated.	Remarks on Treatment—Later History of Case.
$\frac{20}{100}$	Outer ciliary margin.	Enucleation.	The mass involves the whole thickness of the iris, but appears to have grown chiefly in a forward direction; its greatest thickness is at least three times that of the healthy iris. The mass consists of closely packed cells, which in some places are densely pigmented, in others almost entirely unpigmented; in shape spindle and round cells. Mass freely traversed by small blood-vessels. The surface is dotted in many places with secondary deposits of melanotic cells. Ligamentum pectinatum contains proliferating cells. In some sections the cells appear to have entered and passed some distance into the sclera, following the course of Schlemm's canal; they have found their way very freely into the anterior limit of the ciliary muscle, and are infiltrating between the muscular fasciculi. This examination was made by Mr. Priestley Smith.	
Normal until tumor covered pupil.	Lower part left iris.	Excision.	The mass consisted of delicate fibrous tissue with cells, some of the latter having several nuclei. Contained pigment.	
		Enucleation.	The white mass which fills the A. C. under the microscope is a neoplasm made up of cells of varying size and shape. The tumor begins at pupillary margin and reaches Descemet's membrane. The cells develop from the endothelium of the iris. The neoplasm is unpigmented.	
$\frac{5}{6}$	Lower-outer quadrant.	Iridectomy.	Section shows the structure of a spindle-celled sarcoma, with a good deal of fibrous tissue dividing it into alveoli.	A personal letter from Dr. Thompson, dated March 2, 1901,—a little over two years after operation,—says that he has recently seen the patient and there is no sign of recurrence.
$\frac{5}{20}$	Inner portion of iris.	Enucleation.	Leucosarcoma of iris.	Three months after operation, no recurrence.

Author.	Age. Sex.	History.	Condition when First Seen.	Condition at Time of Operation.	Tension.
71. Veasey.	46. M	L. E. Patient's general history good. Examination of a photograph of the patient taken eight years before showed a suspicious-looking shadow on that portion of the iris occupied by the growth. There is a history of two attacks of "neuralgia" during these eight years. For three months before examination the tumor had increased rapidly in size.	Marked circumcorneal injection. Discolored iris contracted pupil, with post. synechiæ and a brownish growth in iris. The tumor was not as long as the width of the iris, and some iris tissue seemed unaffected both at ciliary and pupillary margins, as well as upon sides. No blood-vessels detected, and no hemorrhages.	Potassium iodide was given for one week, at expiration of which time the growth was nearly twice as large as when first seen, and the local conditions were worse.	
72. v. Hippel.	49. M.	The tumor was first noticed when patient was ten years old. Thirteen years ago (1867) the eye was examined by Dr. Knapp, who found a tumor half as big as a pin-head. The eye has often been red and hemorrhages have been frequent.	1880. The dark-brown tumor fills the entire under-inner quadrant of A. C. Pupil oval. Tumor is everywhere sharply bordered, only below and out is a projecting process, which looks like a line of blood. Many post. synechiæ. V = $\frac{1}{15}$. 1881, X., 30. The tumor seems not be growing. V = $\frac{1}{12}$.	1889. Ten days ago hemorrhage and pain. Conj. red. Ball prominent. Cornea smooth, but quite yellowish-colored, and in greater part opaque. Ball hard. V = 0.	
73. Walker.	59. F.	L. E. Three years ago cataract extracted from left eye without iridectomy. Lately vision has failed in this eye.	There has been no pain nor inflammation. What appeared to be a secondary cataract, slightly pink in color, filled the pupil. Iris seemed rotten and was adherent to capsule. Discission was performed without benefit.	The eye became subacutely inflamed and was excised three weeks later.	
74. Webster and Van Gieson.	60. F.	L. E. Until four weeks ago patient was not conscious of any trouble with either eye. Then noticed a mist before the left eye. The sight varies, being much worse at times. No family history of cancer.	L. V = $\frac{20}{200}$. Pupil widely dilated except down and out, where there is a tumor of the iris as large as a small pea. The tumor is nearly in contact with the cornea; it seems to extend to the ciliary region. Pulsation of retinal arteries, but no glaucomatous cupping.	Two days later V L = $\frac{20}{70}$.	+2.
75. Wedl and Bock.		No clinical history. The anatomical description is from an enucleated ball.			
76. Werther.	60. F.	R. E. Patient had noticed a brown spot in the iris for a few weeks.	A brown-black tumor in iris, size of a millet-seed. Eye free from inflammatory symptoms. The physician first consulted recommended iridectomy, but Prof. Kamocki advised enucleation.		
76. Werther.	72. F.	R. E. Patient knew nothing about the development of her condition.	A brownish-black tumor, touching the cornea. Pupillary border unaffected. Eye is free of pain and of inflammatory symptoms.		

Vision.	Primary Position of Tumor.	Operation.	Microscopical Examination of Iris and Globe if Enucleated.	Remarks on Treatment—Later History of Case.
$\frac{5}{17}$	Upper-inner quadrant.	Iridectomy.	Pigmented round-cell sarcoma.	A letter from Dr. Veasey, dated March 6, 1902, says: "There has not been the least sign of recurrence of the disease."
	Under-inner quadrant.	Enucleation.	The entire bulb is taken up with a tumor consisting of polygonal cells with very wide, vascular spaces; the cells are in great part pigmented.	
		Enucleation.	The growth fills the whole eye in front of the fossa patellaris of the vitreous, and is shaped like a large lens. The pigment layer is stretched over its posterior surface and the growth extends to the cornea in front, obliterating the anterior chamber. The structure is that of a spindle-celled sarcoma.	
	Down and out.	Enucleation.	A pedunculated, mottled, light- and dark-colored ellipsoidal nodule ($4 \times 3 \times 3$ *mm*) attached to posterior surface of the iris by a broad base. On one side the root of the iris and the adjacent portion of the ciliary body are replaced by an extension of the tumor cells. Melanosarcoma of the iris. The melanosarcoma partly filled the A. C.; it had an irregular build and was bordered on the one side by the posterior surface of the cornea on the other side by anterior capsule of the lens, which is pressed backwards. The ciliary processes on one side are infiltrated with tumor cells.	
Good.	Down and in.	Enucleation.	Spindle-celled sarcoma pigmented. Schlemm's canal, ligamentum pectinatum and ciliary body infiltrated with tumor cells.	
Blind from senile cataract.	Outer-inner quadrant.	Enucleation.	Pigmented spindle-celled sarcoma. Ciliary muscle and processes invaded by tumor cells. Schlemm's canal contains tumor cells.	

Author.	Age. Sex.	History.	Condition when First Seen.	Condition at Time of Operation.	Tension.
77. Whiting.	49. M.	L. E. Patient states that the tumor was first noticed when he was ten years old. In 1867, when he was thirty-one years of age, he consulted Dr. Knapp about the growth, which at that time was very small, but which occasionally caused an inflammation of the eye, attended by slight hemorrhages into the anterior chamber.	1880, July. Tumor fills lower-inner quadrant of A. C., covering inferior internal margin of the pupil, which is oblong and does not react to light because of synechiæ. Boundaries of tumor on all sides sharply defined, only on the outermost edge of the lower portion is seen a root-like projection. Diagnosis: melanoma. V O D = $\frac{20}{30}$. V O S $\frac{20}{30}$. 1881, October. Tumor appears not to have increased in size. V O D = $\frac{20}{30}$. V O S $\frac{20}{30}$. 1882. November. Tumor decidedly increased in size, spreading forward over the pupillary margin and to the cornea, which is opaque at this point. Field narrowed. V = $\frac{20}{100}$. Enucleation advised and declined.	1889, September. Seven years have elapsed since last examination. Patient returns because of unendurable pain for preceding ten days. Conj. bulbi markedly congested. Globe probably 2 or 3 *mm* more prominent than other eye. Cornea smooth but yellow in color; it is not possible to say whether the substance of the cornea is yellow or the discoloration is due to the compact tumor lying close to it. V = o. T increased.	+
78. Wiegman.	43. F.	R. E. Good family history. In early youth had inflamed eyes. Since birth has had black tumor on iris; the mother saw this a few days after birth. The tumor has remained unchanged in size.	1885, March. Iris light gray; in it is a nearly black tumor 2 *mm* in diam. Otherwise eye is normal. V = $\frac{1}{2}$. Told to let tumor alone and to return for observation.	1891.—Patient returned for first time. Tumor is larger, now presses on the cornea and invades the pupil. Eye free from irritation. Iridectomy done; it was necessary to detach the tumor from the posterior surface of the cornea. Eight months later growth reappeared in scar and this was cauterized.	
79. Williamson.	14. F.	The growth was noticed as a small yellow speck six months before admission to hospital. It apparently began at the periphery of the iris, and as it grew it encroached on the pupillary margin. There had been no inflammation about the eye.	Growth was of a bright yellow color and stood out strikingly against the background of the iris. By strong light and high magnifying power little vascular tufts could be seen on its surface. No sign of the tumor could be made out posteriorly.		
80. Zellweger.	75. F.	R. E. Has noticed for a long time a spot on the under part of the iris. This six or seven weeks before the examination began to grow, and it has become very noticeable. With the growth the vision has decreased and the eye become painful.	In the iris there was a small, pale-red tumor; pupil sluggish and eye not inflamed. Aqueous clear. T normal. Lens cataractous. Tumor about 3 *mm* broad by 2 *mm* high. No signs of iritis or inflammatory reaction. Patient refused operation.	One month later the tumor was larger, and after three weeks the patient returned for operation. The eye was not inflamed.	

THE ABSTRACTS OF THE HISTORIES GIVEN IN THIS DIVISION FURNISHED THE AUTHORS

Reporter.	Age. Sex.	History.	Condition when First Seen.	Condition at Time of Operation.	Tension.
Coe, Anton Washington, D. C.	40. F.	Neuralgic pain at intervals, accompanied by much conjunctival congestion.	The tumor encroached on pupil above. It lay in contact with lens and occupied the posterior chamber.		+

Vision.	Primary Position of Tumor.	Operation.	Microscopical Examination of Iris and Globe if Enucleated.	Remarks on Treatment—Later History of Case.
0.	Lower-inner quadrant.	Enucleation.	Sarcoma involving the choroid.	Six months subsequent to the operation patient reports himself in perfect bodily health and with no irritation of orbital tissues.
$\frac{6}{6}$	Under-outer quadrant.	Iridectomy.	Pigmented spindle-celled sarcoma.	At the time of closing the history, the writer states that in the iris, on both sides of the pillars of the coloboma, there are light brown spots; a drawing shows similar spots in the scar.
Normal.		Enucleation.	The cells are typically spindle-shaped. There are imperfectly developed blood-vessels. The neck of the tumor, composed of spindle cells, extends along a vessel and into the ciliary body.	Iridectomy was attempted, but was impossible because of posterior allusions.
		Iridectomy.	The tumor arose from the posterior layers of the iris.	A note, made one year after the operation, says that nothing new had appeared in the eye, but the condition was changed, in that the woman complained of loss of appetite, and the writer ventures the opinion that a metastasis had taken place to the internal organs.

ARE FROM PRIVATE AND HITHERTO UNPUBLISHED RECORDS FOR THIS PAPER.

Vision.	Primary Position of Tumor.	Operation.	Microscopical Examination of Iris and Globe if Enucleated.	Remarks on Treatment—Later History of Case.
Good.	Upper part of iris.	Enucleation.	Melanosarcoma.	Operation was postponed on account of pregnancy.

Reporter.	Age. Sex.	History.	Condition when First Seen.	Condition at Time of Operation.	Tension
Pick, A., Zurich, Switzerland.	40. F.	30, I., 1900. Patient came on account of a brown spot in the iris, which she says had been there since birth, but it has grown for two years. The spot reached the margin of the pupil one year ago. Examination with the lens shows that it is a tumor, distinctly elevated above the surface of the iris that reaches the margin of the pupil, but not the ciliary border of the iris; considering the latter fact a broad iridectomy was done.		There was before operation incipient cataract of both eyes at the equator. The iridectomy was to such an extent peripheral that not only the edge of the lens but nine ciliary processes could be seen.	Normal.
Nelson, J. R. and Thompson, E. S., New York.	22. F.	L. E. Patient had noticed a nodule on iris for twelve years which has gradually increased in size; in the last three years, growth has been more rapid. Vision has failed gradually. Two years ago enucleation was advised but refused. There have been spontaneous hemorrhages.	1901, Jan'y. Dark pyramidal mass fills lower half of A. C. and extends to upper margin of pupil. Some blood in A. C. Numerous small hemorrhages between cornea and iris, giving growth a "marbled appearance."		Normal.
Post, M. H., St. Louis, Mo.	32. F.	R. E. A tumor of the iris, which was removed by iridectomy, 18th June, 1890.			
*Randolph, R. L., Baltimore, Md.	54. M.	R. E. The general condition good. Patient applied for glasses when condition was discovered.	A small, triangularly-shaped mass invaded the pupillary space on the nasal side; the growth filled posterior chambers on that side. Eye free from congestion.		Normal.
Robertson, C. M., Chicago.	54. M.	L. E. General health good. The growth in iris is of six weeks' standing.	Small elevated spot 2 *mm* in diameter.	Elevation increased to 4 *mm* in two weeks. The tumor pressed against the cornea.	Normal.
†Rogers, W.K., Columbus, O.	46. M.	L. E. General health good; family history negative. Patient complains of slight pain and sense of irritation, which has been constant for about six months.	Slight engorgement of conjunctival vessels overlying the region of the tumor; cornea and media clear; iris reacts to light and accommodation in upper-inner half. Pupil encroached upon in lower-outer segment by tumor, which involves ¼ to ⅓ of the circumference of the iris. Tumor projects into the A. C. about 2 *mm*. Over the tumor tortuous vessels can be distinctly seen. Color slightly darker than neighboring iris.	Immediate enucleation was advised but refused.	
Rogman, Ghent, Belgium.	38 F.	The person is scoliotic, otherwise of good health. No history of tumors in family. The disease has been noticed for nine months.		The tumor is about the size of a little pea. The iris in the region not occupied by it is quite movable. No signs of irritation. Myopia > 20 D. Crystalline lens and vitreous quite transparent.	

* This case is included, for while it forms an exception to the other reports in that there was no histological examination
† This case is included, for although there was no histological examination

Vision.	Primary Position of Tumor.	Operation.	Microscopical Examination of Iris and Globe if Enucleated	Remarks on Treatment—Later History of Case.
Feb. 14, 1900. Cyl + 2. V = $\frac{6}{18}$. April 5, 1900. Cyl = 1.5. V = $\frac{1}{1}$. March 13, 1901. −0.75 — 2. cyl. V = $\frac{1}{1}$.		Iridectomy. 1, II., 1900.	Microscopical examination of the part of the iris that was removed was made by Prof. Ribbert. His diagnosis was "melanoma"; his prognosis, because enucleation was not done, was *unfavorable*.	13, III., 1901. The condition of the patient is excellent and no trace of recurrence. "The contention again brought forward, that in cases of sarcoma enucleation must necessarily be performed, I consider fundamentally wrong. The general surgical law that in malignant neoplasms *all tissue involved* must be removed, may be carried out by simple iridectomy if the boundaries of the tumor are clearly visible as they were in my case."
$\frac{10}{10}$	Lower part of iris.	Iridectomy. Two days later, after histological examination, enucleation.	Small spindle-celled, pigmented sarcoma. Ciliary body invaded, but no extension beyond.	
	Lower-outer quadrant.	Iridectomy.	Small spindle-celled sarcoma.	Nov. 19, 1901.—The patient is living and in excellent health. V., with correction, $\frac{20}{20}$.
$\frac{10}{10}$	Nasal side.	Enucleation.	Sarcoma iris.	The patient later saw another oculist, who persuaded her to have eye removed. Two years after enucleation, death from metastases.
Normal.	Upper-outer quadrant.	Iridectomy. Later enucleation.	Melanosarcoma. Ciliary body invaded.	Six weeks after the iridectomy the tumor reappeared and the eye was enucleated. No further return of the growth.
$\frac{5}{5}$	Lower-outer segment of iris.		Dr. Rogers did not get the globe for examination. The recurrent growth was a small, round-celled sarcoma.	One year after the enucleation was first advised, the patient had the eye removed by another surgeon. Within six months after enucleation the patient was seen again and had growth in orbit; this was removed, but followed by recurrence and death in eighteen months.
[Not exactly determined.	Lower-inner quadrant of the iris.	Enucleation, 28th June, 1894.	Leucosarcoma with little round cells, at some places fasciculated. In the middle the tumor penetrated into the ciliary body.	Two and one half years later there was no relapse. This case will be elsewhere more fully reported by Dr. Rogman.

made of the primary iris-tumor, the diagnosis is assured by the metastatic growths which killed the patient. of the globe, there was such an examination of the recurrent growth in the orbit.

Reporter.	Age. Sex.	History.	Condition when First Seen.	Condition at Time of Operation.	Tension.
Sattler and Krückmann, E.	50. F.	L. E. 16, III., 1888. Iridectomy was done for inflammatory glaucoma. This was followed by improvement of vision to $\frac{5}{10}$. Vision became poorer in 1889, when diagnosis was made of sarcoma of iris and ciliary body. Enucleation was advised, but others spoke against it.		18, III., 1893. The tumor is less in the upper part of the chamber but extends to the posterior surface of the cornea and to the region of the sphincter iridis, sparing the latter. Diagnosis: melanosarcoma.	Not increased.
Sattler, Robert.	49. F.	Large pigment spot since birth in outer and upper quadrant of iris.	There was neither pain, discomfort, nor impairment of sight. Patient came for refraction (hyperopia and presbyopia). At that time there was a distinct, nodular, pigmented neoplasm about the size of a grain of wheat.	Three years after the first and only visit the patient returned with history of great suffering and clinical picture of absolute glaucoma. T + 3. V = 0. Excessive pain.	
*22. Schulch, Wm. and v. Grósz, Emil.	41. M.	28, XI., 1890. Vision has been growing poor for two years; eye blind for one year.	Liver-colored tumor on iris.		+
*22. Schulch, Wm., and v. Grósz, Emil.	39. F.	25, IX., 1885. The tumor has been developing for seven months.	A brown tumor on the iris.		Normal.
Smith, Eugene.	62. M.	R. E. Had been treated for iritis for six weeks.	A black tumor, size of a small split pea, in iris.	Ciliary injection. Tumor growing rapidly.	+
Smith, Eugene.	65. M.	R. E. Eye has felt uncomfortable for several weeks.	A small, brownish growth is seen in the iris, of about the size of a split pea. Some pain around the eye.	Slight ciliary injection in the region of the growth. The tumor has been rapidly increasing in size.	Normal.
Smith, Eugene.	58. M.	L. E. Eye has been painful and red for several weeks.	The growth is on the nasal side of iris, and is the size of a large kernel of wheat.	Ciliary injection. Eye is painful.	
The following report was sent to us from the clinic of Prof. Schnabel. We are unable to say to whom we are indebted for it because no name was signed, nor did a card accompany the history.	51. F.	L. E. Three-quarters of a year ago, patient noticed a black spot in the mesial half of the left iris, which grew slowly. Later a similar spot appeared laterally. For several months patient has had photophobia as well as left-sided headache. For that reason she came for treatment to the eye clinic (Hofrath Schnabel).	I., 7, 1901. Iris mesially and below is evenly brown-black, thickened three- or fourfold, and considerably narrowed, so that the pupil is displaced downward and inward. The rest of the iris, which is blue-gray, appears normal, but below and out is one hemp-seed-sized tumor; above are several smaller brown-black nodues. The reaction of pupil to light is absent in the region of tumor; normal elsewhere. The anterior chamber is of normal depth. On the posterior corneal surface and on anterior capsule of the lens are some small clumps of pigment. *Vitreous and fundus* normal. Cornea slightly cloudy, episcleral vessels increased in size and number. There are several pigmented spots in the sclera.		+ 1.

* This case was observed in the Royal Hungarian Eye Clinic (Budapest)

Vision.	Primary Position of Tumor.	Operation.	Microscopical Examination of Iris and Globe if Enucleated.	Remarks on Treatment—Later History of Case.
Amaurosis.	Upper part of the iris.	Enucleation.	The portion of the tumor in the iris was richly pigmented; that in the ciliary body very slightly. It is chiefly a large-celled sarcoma, which extends to the region of the ora serrata, where its termination is sharply defined. Anteriorly, about the ligamentum pectinatum, a few bundles of the ciliary muscle can still be recognized, but none posteriorly. Besides these findings, the eye presents the appearance of a chorio-retinitis of long standing, with complete ablatio retinæ, atrophy of the retina, with hyperplasia of the connective tissue and inflammatory scar tissue in the choroid.	
At time of operation = 0.	Upper-outer quadrant of iris.	Enucleation.	Small spindle-celled sarcoma.	No metastasis. Health of patient remained good.
0.	Below.	Enucleation.		Recurrence in orbit in 1895. Report to authors from Prof. von Grósz.
$\frac{5}{14}$	Above and in.	Enucleation.	Spindle-celled sarcoma, slightly pigmented.	Patient died of metastasis.
$\frac{10}{10}$	Lower half of iris and ciliary body.	Attempted iridectomy, but as tumor extended to ciliary body the eye was enucleated.	Melanotic sarcoma of iris and ciliary body. Spindle and round cells.	Six months later the patient died of metastases to lungs and liver.
$\frac{10}{10}$	Lower part of iris.	Iridectomy.	Melanotic spindle-celled sarcoma.	No history of recurrence.
$\frac{10}{10}$	Iris nasal side.	Iridectomy.	Melanotic sarcoma. Mixed cells.	No recurrence.
$\frac{5}{10}$ with +1.5. V of normal eye = $\frac{5}{10}$ with +1.5.	Mesial half of iris.	Enucleation. I., 8, 1901.	Melanosarcoma, consisting chiefly of spindle cells. The iris tissue in the region mentioned is completely replaced by it; the well-preserved pigmented area is everted; the ciliary body is normal. The tumor passes into the angle of the chamber only up to the ciliary muscle. The *ligamentum pectinatum is involved by the neoplasm in toto, even in its whole circumference*, while collections of cells—especially in the above-mentioned spots—extend through the sclera and rest of iris in scattered spots. No nævus cells anywhere. Beginning glaucomatous degeneration of the optic nerves, but without excavation. In the anterior capsule of the lens and the posterior surface of the cornea are small accumulations of pigmented round cells.	Primary wound healing. Discharged in a week. Nothing more known.

by Prof. Wm. Schulch; the history was sent to us by Prof. v. Grósz.

A CASE OF TRAUMATIC ENOPHTHALMOS.

By Dr. H. W. KILBURN, Boston.

(*With a photographic figure.*)

TRAUMATIC enophthalmos is so infrequently seen, and so many different theories have been advanced in explanation of the condition, that I think the following case will be of interest.

The patient, a man of fifty-three, consulted me on Jan. 24, 1902. He gave the following history: On Jan. 19, 1901, he was thrown from a sleigh, striking on his left shoulder and the left side of his face, on icy ground. His glasses were broken, and the fragments of glass lacerated the upper lid of the left eye extensively; but he stated that the attending surgeon had said that the wounds did not extend entirely through the lid. There was general subconjunctival hemorrhage, and I have since learned from the attending surgeon that "the eye itself was considerably contused." The wounds of the lid healed in a week. Ten days after the accident it was noticed that the eye seemed to be "sinking back," and that the upper lid "drooped slightly." There was no diplopia, and there has been none at any time since. There has never been any pain in the eyes or head.

On examination, I found the following conditions: Several minute linear scars were to be seen in the skin of the left upper

lid, near the eyebrow. The left eyeball was sunken several millimetres farther back in the orbit than the right; but I made no attempt at exact measurement of the amount. There was slight ptosis, the width of the left palpebral fissure being about two-thirds that of the right. The ophthalmoscope revealed nothing pathological in either fundus. The pupils were of equal size, and reacted normally both to light and in accommodation. The tension of each eye was normal. The vision and refraction were as follows:

R. V. = $\frac{6}{6}$, with correction of glasses V = $\frac{6}{4}$.
L. V. = $\frac{6}{18}$, with correction V. = $\frac{6}{4}$.
Orthophoria vertically. Esophoria 2°.

With appropriate correction for his presbyopia, the patient read Snellen 0.5 with ease. Except for the slight disfigurement, he was as well off as before the accident.

While it is, of course, extremely probable that many more cases of traumatic enophthalmos have occurred than have been reported, the affection would, nevertheless, appear to be of infrequent occurrence, as only fifty-one undoubted cases have been reported up to the present date. There are eight more cases which have been classed under this head; but these should really have been classed as dislocations of the globe. Schapringer, in 1893, called attention to the fact that we should distinguish between cases of dislocation and those of true enophthalmos, by which is meant a sinking backward of an eye following an injury, and *not* the violent forcing backward of the eye. The case he was discussing at the time was the classic one of Henricus Smetius, in which the globe was driven down into the nose. In the cases of von Becker and Tweedy, the globe was dislocated backwards. In that of Langenbeck, it was dislocated into the antrum. Such cases as these may be fairly ruled out of the list.

As I have said above, there are various theories as to the way in which traumatic enophthalmos is produced. I shall outline them briefly.

Himlev thought that, in his case, the condition was due to a breaking off of the trochlea, and a consequent relaxation of the superior oblique.

In NIEDEN's case, the patient had been subjected for a long time to the pressure of a large mass of earth which had fallen on him. Nieden explained the enophthalmos by assuming an atrophy of the orbital fat from the long-continued and powerful compression of the globe.

GESSNER thinks that a mild periostitis and inflammation of the retrobulbar fat tissue follows the injury, and that the resulting cicatricial contraction of the orbital contents permits the eye to sink backwards.

LANG believes that, in such cases, there is always a fracture or depression of the orbital walls, and that the pad of fat, being only of sufficient size to fill the retrobulbar part of a normal orbit, sinks into the depression, causing a vacuum, and that the eye is forced back by atmospheric pressure.

SCHAPRINGER maintains that, in his first case, the ptosis, enophthalmos, and diminished ocular tension were due to a lesion of the sympathetic, and consequent paralysis of Mueller's orbital muscle. He believes that there was a lesion of the sympathetic root of the ciliary ganglion.

BEER thinks that enophthalmos is due to a central or peripheral lesion of the sympathetic and perhaps of the trigeminus. He thinks that there results an atrophy and absorption of the orbital cellular tissues, which permits the eye to sink backward.

MAKLAKOW's theory is that enophthalmos is produced by a lesion of the peripheral branches of the sympathetic, caused by a hemorrhage from the ophthalmic artery. He believes that this hemorrhage is limited to the posterior portion of the orbit, back of the ciliary ganglion, and that it at first causes an exophthalmos. He thinks the exophthalmos produces in turn an irritation of the nerves which causes a strong contraction of the external ocular muscles, so that they approach nearer to each other, confining the hemorrhage in a space bounded by the globe, the muscular cone, the optic nerve, and the posterior walls of the orbit, and, at the same time, retracting the globe.

LEDERER's theory is that there are fractures of the orbital walls in all cases of traumatic enophthalmos; that, with these fractures, there are hemorrhages into the orbital tissues, producing at first exophthalmos; and that the tearing of the tissues by the hemorrhage results in cicatricial contraction, which, in turn, causes enophthalmos.

SHOEMAKER believes enophthalmos to be caused by a rupture

of Tenon's capsule or the thickened bands of this known as the check ligaments. He calls attention to the fact that the check ligaments contain smooth muscular fibres which are innervated by the sympathetic. He writes as follows: "It seems to me that Tenon's capsule and the check ligaments must always play an important part, and, in some cases, the *all*-important part, in enophthalmos. Relaxation of the capsule, from any cause whatever, would *permit* recession of the eyeball, and a sufficient rupture of the capsule, either near the orbital margin or in that division passing behind the globe, or rupture of the check ligaments if extensive, would, it seems to me, of necessity be followed by enophthalmos. Many cases of enophthalmos can be readily explained in this manner, and the case which I now report below I regard as probably caused by a direct rupture of some portion of Tenon's capsule, most likely the posterior sling, for the reason that recession did not immediately follow the injury. This could be accounted for by the fact that rupture would be accompanied by a hemorrhage which would materially increase the orbital contents behind the globe, thus counteracting the loss of support from before until absorption had taken place. Indeed proptosis might be the immediate result of an injury leading ultimately to enophthalmos."

He discusses Beer's theory as follows:

"Admitting that sufficient absorption of the cellular tissue of the orbit may result in enophthalmos, and without attempting to controvert the possibility of such absorption being caused by lesions of the sympathetic, and that such lesions are producible by the traumatisms reported, I simply wish to put the question: If these nerve lesions can produce nutritional changes in the orbital cellular tissue resulting in atrophy, can they not also produce similar changes in Tenon's capsule, thus robbing it of its power properly to support the eyeball in its normal position? For it must be remembered that the check ligaments contain smooth muscular fibres, and are also under the influence of sympathetic innervation. And, in connection with this, the thought suggests itself,—cannot exophthalmos be produced by irritation of the sympathetic in the reverse way, *i. e.*, by causing these muscular fibres to contract?"

He considers the theory of cicatricial contraction untenable because enophthalmos frequently occurs too soon after

the injury to be accounted for in this way; because the globe is usually freely movable; and because he believes that, were the theory true, we should often get enophthalmos after cases of orbital cellulitis, whereas such is not the case.

Personally, I am strongly inclined to agree with Shoemaker. I feel that, all things considered, his theory explains such cases more satisfactorily than any other yet offered; but I think it quite possible that paralysis of the sympathetic may play some part in the production of enophthalmos. I think that, in my own case, in which the enophthalmos was noticed ten days after the injury, sufficient time had not elapsed to make the theory of cicatricial contraction a probable one. At all events, sufficient time had not elapsed for the *full effect* of cicatricial contraction to be observed, and yet, if we may accept the patient's statement, the eye has not receded any farther than it had when the phenomenon was first noticed. His statement is, in my opinion, worthy of credence, as he is a thoroughly educated dentist, and, therefore, is presumably a man of trained powers of observation. I cannot think, however, that, in this particular case, the injury to Tenon's capsule can have been at all extensive, because, were this the case, I should suppose there would have been a diplopia transient or permanent, or, at least, a marked heterophoria. Although Shoemaker's theory attracts me more than any other one theory, I must admit that a lesion of the sympathetic may, as I have said above, play some part in the production of enophthalmos. Shoemaker himself seems to be of this opinion; for, in the quotation from his article of 1900, given above, he says that the admission of a lesion of the sympathetic as the cause of enophthalmos does not contradict his theory, since the check ligaments contain smooth muscular fibres which are innervated by the sympathetic, and a paralysis of these fibres would cause relaxation of the capsule. Furthermore, he points out that trophic changes resulting in atrophy might thus be caused in the capsule as well as in the cellular tissues of the orbital fat.

In regard to the theory of Himly that fracture of the

trochlea and consequent relaxation of the superior oblique would cause enophthalmos, I would say that, while this may be so, I have seen a case in which the trochlea had been fractured, and yet there was no enophthalmos. The theories of Lang and Maklakow I cannot agree to in any respect. Lederer's theory would attract me were it not for the fact that the enophthalmos occurs, in most cases, too soon after the injury to make the theory probable. It is somewhat similar to Gessner's, except that Gessner presupposes a periostitis of the orbital bones.

It is to be hoped that we may sometime discover the true explanation of this interesting condition.

BIBLIOGRAPHY.

1. HENRICUS SMETIUS, *Centralbl. f. prakt. Augenheilk.*, vol. xiii., p. 191 (one case). 2. HIMLY, *Krankheiten u. Missbildungen des Menschlichen Auges*, 1843, Part 1, p. 395 (one case). 3. v. BECKER, *Arch. f. Ophth.*, 1866, vol. xii., Part 2, p. 289 (one case). 4. LANGENBECK, *Arch. f. Ophth.*, 1867, vol. xiii., Part 2, p. 447 (one case). 5. HARLAN, *Phil. Med. Times*, 1871-1872, vol. ii., p. 448 (one case). 6. NAGEL (quoted by Berlin), *Graefe u. Saemisch. Handb. der Gesammt. Augenheilk.*, 1880, vi., p. 501 (one case). 7. NIEDEN, *Klin. Monatsbl. f. Augenheilk.*, 1881, xix., p. 472 (one case). 8. TALKO, *Klin. Monatsbl. f. Augenheilk.*, 1881, xix., p. 471 (one case). 9. GESSNER, *Arch. f. Augenheilk.*, xviii., p. 297, 1888 (three cases). 10. LANG, *Trans. of the Ophth. Soc. U. K.*, 1889, ix., p. 41 (one case). 11. TWEEDY (quoted by Lang), *loc. cit.*, p. 42 (one case). 12. HANSELL, *Trans. Phil. County Med. Soc.*, 1890 (one case). 13. LOEW, *Inaug. Dissert.*, Berlin, 1890 (one case). 14. SCHAPRINGER, *N. Y. Med. Monatschr.*, June, 1890 (one case). 15. G. COLIN, *Klin. Monatsbl. f. Augenheilk.*, 1892, xxx., p. 337 (one case). 16. SCHWARTZSCHILD, *N. Y. Med. Record*, May 14, 1892 (one case). 17. BEER, ARCH. OF OPHTH., 1893, xxii., p. 98 (two cases). 18. SCHAPRINGER, *Klin. Monatsbl. f. Augenheilk.*, 1893, xxxi., p. 309 (one case). 19. FUCHS, *Wiener Klin. Wochensch.*, 1893, No. 10 (one case, same as following). 20. SACHS, *Beitraege zur Augenheilk.*, 1894, Heft xiv., p. 44. 21. ALEX. OGILVY, *Ophth. Rev.*, 1894, vol. xiii., p. 145 (one case). 22. VAN DUYSE et BRIBOSIA, *Arch. d'Opht.*, 1895, T. xv, Nr. 3, p. 159 (one case). 23. DENIG, *Arch. f. Augenheilk.*, xxviii., 1894, p. 276 (one case). 24. OLIVER, *Ophth. Record*, 1897, No. 1 (one case). 25. NEULEN, *Inaug. Dissert.*, Greifswald, 1897 (one case). 26. BRUNNER, *Ophth. Record*, 1897, Sept. (one case). 27. ROBERTS, ARCH. OF OPHTH., vol. xxv., No. 3 (one case). 28. MAKLAKOW, *La Clin. Opht.*, 1897, p. 219 (one case); and another, *La Clin. Opht.*, 1898, p. 38. 29. DARIER, *La Clin. Opht.*, 1898, p. 39 (one case). 30. ZIMMERMANN, ARCH. OF OPHTH., vol. xxv., No. 2, 1897 (one case). 31. FRANKE, *Klin. Monatsbl. f. Augenheilk.*, xxxvi., p. 265, 1898 (three cases).

32. MANZ, *Muench. med. Wochenschr.*, 1898, Nr. 14, p. 433 (one case). 33. PURTSCHER, *Arch. f. Augenheilk.*, 1899, xxxviii, p. 144 (two cases). 34. TREACHER COLLINS, *Proceedings of Ophth. Sec. of Brit. Med. Assoc.*, Aug., 1899 (five cases). 35. FISCHER, *Centralbl. f. prakt. Augenheilk.*, 1899, p. 45 (one case). 36. DENIG, Section in Ophth., N. Y. Acad. of Med., April 17, 1899 (one case). 37. BURNETT, *Amer. Jour. of Ophth.*, 1899, July (one case). 38. AYRES, *Amer. Jour. of Ophth.*, 1899, Nov. (one case). 39. DAULNOY, *De l'Enophth. traumatique*, Nancy, 1899 (one case). 40. PRAUN, *Die Verletzungen des Auges*, Wiesbaden, 1899 (one case). 41. DAULNOY, *La Clin. Opht.*, 1900, p. 66 (one case). 42. MICAS, Bericht in *La Clin. Opht.*, 1900, p. 90 (one case). 43. WILBRAND u. SAENGER, *Die Neurol. des Auges*, Wiesbaden, 1900, Band i., p. 438 (one case). 44. FLEMMING, *Lancet*, 1900, No. 3994, p. 771 (one case). 45. SHOEMAKER, *Annals of Ophth.*, July, 1900 (one case). 46. MAKLAKOW, *La Clin. Opht.*, 1901, p. 145 (one case). 47. LEDERER, *Arch. f. Ophth.*, liii., Heft 2, p. 241, 1902 (two cases). 48. KEPINSKI, *Warschauer Aertze-Gesells.* (quoted in *Wochensch. f. Therapie u. Hygiene des Auges*), vol. v. p. 148 (one case). 49. BELLARMINOW, refr. in *Klin. Monatsbl.*, May, 1902 (one case).

TWO NOTEWORTHY CASES OF EXTRACTION OF IRON FROM THE VITREOUS CHAMBER BY MEANS OF THE GIANT MAGNET. A NEW PROCEDURE.

By Dr. CHAS. J. KIPP, Newark, N. J.

THE extractions of fragments of magnetic metals from the vitreous chamber or the retina by means of the giant magnet has now been done so often and the number of cases already on record is so large that it seems hardly worth while to publish any more. If I, nevertheless, put two more on record, I do so, because in the one I succeeded in removing a large piece of iron through the wound of entrance, after it had become entangled and could not be budged, by the successful application of the familiar law of magnetic polarity, which, so far as I know, had never before been made use of in such cases.

The second case is noteworthy because of the complete clearing up of the opacity of the lens following the passage through it by the foreign body.

Case 1.—A young man while engaged in hammering, felt something strike his left eye, and this was followed by the escape of much watery fluid from the eye. His sight became greatly impaired immediately. He was seen by a physician who noticed a wound at the outer sclero-corneal junction, and thought that he saw a foreign body deep in the wound. He dropped atropine in the eye and then sent him to me. I saw him a few hours after the accident. There was no irritation about the eye. The conjunctiva was not injected. The cornea was clear, and in the sclera close to the outer margin of the cornea in the horizontal meridian was a linear wound about 2 *mm.* in length, parallel with

the margin of the cornea, from which vitreous body was escaping. The anterior chamber was very shallow and contained a little blood; the pupil was somewhat dilated. The iris near the wound was torn, the lens clear as far as it could be seen, and the vitreous full of dark floating opacities. With the ophthalmoscope I could see a dark mass at the bottom of the vitreous chamber but could not make out what it was. I placed the eye close to Hirschberg's simplified sideroscope and the needle indicated the presence of iron in the eye at once. After cocainization and cleansing of conjunctival sac, the eye was brought up to the giant magnet and while still more than two inches from it, as soon as the current was turned on, I saw a large glistening piece of metal back of the lens rise up and rush towards the outer part of the eye, where it caused a marked bulging of the sclera, at a point about 6 *mm* posterior to the wound of entrance. Here one end of the piece of iron which seemed too long and broad (while in the eye) to make its removal practicable without total destruction of the eye, had become fastened, and no matter in what position the eyeball was put or how the magnet was moved it would not budge. To get it out of the eye nothing short of a large incision in the sclerotic seemed practicable and this would probably have caused the loss of much more vitreous. While deliberating what to do, it occurred to me that I might possibly dislodge the entangled end of the iron by bringing the like pole of the magnet to act upon it. I therefore turned the magnet around on its pivot, and as soon as the other pole (not previously used) came near the eye I saw this large mass of iron swing around in the vitreous chamber, the bulged part of the sclera became flat, while the other end of the iron came towards the wound of entrance and, in less time than it takes to tell of it, shot out of the wound of entrance on to the magnet. A bead of vitreous protruded from the wound. The eye was cleaned once more, atropine was instilled, a bandage applied, and the patient put to bed. There was no reaction whatever. The wound soon closed. At first it seemed as if the lens had escaped injury, but a week after the operation it became cloudy, and in the following weeks became opaque throughout. The eye has good perception, and the visual field is intact. The iron removed measured 18 *mm* in length, was about 2 *mm* in width at one end and about 1 *mm* at the other, where it was pointed, and was quite thin. It weighed 10 *mg*. It is the *longest* piece of iron that I have extracted from the eye.

Case 2.—The patient was employed in a brewery, was about thirty years of age, and the foreign body struck the right eye, at the outer sclero-corneal junction in about the horizontal meridian. I saw him a few hours after he had felt the foreign body enter. The wound of entrance was small, the foreign body had passed through the iris leaving a small hole, had entered the lens below and had passed through it downwards and backwards and was found in the lower part of the vitreous chamber, amongst blood clots. After the eye had been cocainized and cleaned it was brought near the giant magnet and the patient at once complained of pain in the eye. After a little while, as we gradually brought the eye nearer the magnet, we noticed a marked bulging of the lower part of the iris. Many attempts to get the iron from the posterior chamber by moving the eye in various directions and by moving the magnet failed to bring the iron into the pupil. It was fastened to the posterior surface of the iris. I therefore made a small incision in the cornea, over the bulging part of the iris, placed the patient again close to the magnet, which drew the iron and part of the iris out of the eye. As the iris seemed to be considerably bruised I cut it off, producing a small coloboma. The eye was bandaged and the patient put to bed. There was no reaction. At first the opacity of the lens seemed to increase, then it began to clear up, and now, five months after the operation, only a small opacity in the lower part of the anterior capsule remains. The lens itself is perfectly clear. The vitreous is free from opacities and the vision of the eye with -0.75 is $\frac{5}{5}$. The fragment of iron was not more than *2 mm* in length, narrow and sharp-pointed.

Others have occasionally observed a clearing up of the track of the foreign body through the lens and I have reported similar cases, but this is the only one that I have ever seen in which the opacity of the lens has disappeared completely.

Since this case was operated on, I have in a number of others, in which the iron also became entangled in the posterior surface of the iris, by changing the pole of the magnet succeeded in bringing the iron through the pupil into the anterior chamber and, in fresh cases, out of the wound of entrance without enlarging this, while in cases in which the corneal wound had been closed for days I made an incision at the margin of the cornea, and then drew the iron out by the giant magnet without mutilation of the iris.

A CASE OF BLENNORRHŒA OF THE LACHRYMAL SAC CAUSED BY THE PRESENCE OF A RHINOLITH.[1]

By Dr. CHAS. J. KIPP, Newark, N. J.

A woman, about forty-five years of age, asked my advice about her left eye, which, she said, had been watering and discharging for some months. I found that she had a blennorrhœa of the sac of the left side. The eye was normal. During my examination I noticed that she had difficulty in breathing through the nose, and on questioning her learned that the left half of her nose had been closed for years, that she had consulted physicians about it, and that they had told her that she had a growth in the nose, and caused profuse bleeding from the nose in the attempt to remove it, which had been unsuccessful. While examining her nose, which was filled with a mass of bleeding granulation, my probe struck something very hard like a stone. The hard mass was so large that it filled the lower passage, and could not be made to budge. After free use of cocain and adrenalin I succeeded by the aid of hooks and rongeurs in breaking off some of the sharp projection of the mass and, with much hemorrhage, in extracting it through the anterior orifice. The mass was of irregular form, more like a cube than anything else, was of a dark grayish color, and so hard that I had difficulty in cutting through the outer layer with a fine sharp saw. The nucleus consisted of plant remains, probably a portion of some hair plant, according to Dr. Philip H. Hiss, who kindly examined the rhinolith microscopically.

The blennorrhœa of the sac subsided entirely under pressure and cleansing of the nose by a mild alkaline solution in a few weeks, and there has been no return of the disease since.

The patient has no idea as to how or when the foreign matter got into her nose.

---

[1] Read at the meeting of the Ophthalmological Section, N. Y. Academy of Medicine, May 19, 1902.

A CASE OF STREPTOTHRIX IN THE LOWER CANALICULUS.[1]

By Dr. CHARLES J. KIPP, Newark, N. J.

My patient was a man of about twenty-eight years of age, of American birth, and in good general health. He consulted me with regard to a swelling in the region of the canaliculus of the lower lid of the left eye and persistent lachrymation of this eye. He could not tell when the swelling was first noticed, but he felt sure that it had been gradually growing to its present size in the last two years. He had no pain and the sight of the left eye was good. I found a swelling of about the size of a French bean occupying the region between the punctum of the lower lid and the inner canthus; it was hard, and the skin over it was movable and of normal color. The palpebral conjunctiva corresponding to the position of the swelling was somewhat reddened. The lower punctum was greatly enlarged, everted and had pus in it. Pressure over the tumor caused the escape of a considerable quantity of purulent fluid. The lachrymal sac did not appear to be involved. I made the diagnosis of tear-stone, split the lower canaliculus with a Weber knife, and the concretion was lifted out by a Daviel's spoon. I found that the canaliculus had been converted into a large cavity and the lining mucous membrane was red and swollen. Cleansing of the conjunctival sac was the only treatment required to complete a cure. The concretion was unusually large, was of a somewhat cylindrical form, was coated with pus and, after this had been washed off, of a dirty greenish color. It was about 9 *mm* in length and 6 *mm* in diameter. The concretion was unfortunately put in absolute alcohol, which I did not find out till it was too late to make a

[1] Read at the meeting of the Ophthalmological Section, New York Academy of Medicine, May 19, 1902.

culture from it. The microscopical examination was made independently by several physicians, amongst them Dr. Philip Hanson Hiss, of the Pathological Department of the College of Physicians and Surgeons, Columbia University, New York City, and all are agreed that the fungus of which the concretion was chiefly made up, belongs to the family of streptothrix, but the species must remain in doubt, as no cultures were made.

The number of cases of this disease on record is comparatively small.

Hirschberg has recently put two cases of this kind on record and has reviewed the literature (*Centralblatt f. praktische Augenheilkunde*, January, 1902). His case presented the well-known clinical features; the concretions were situated in the lower canaliculus and consisted of leptothrix. He says that his cases had been treated for a long time by other ophthalmologists, who had failed to recognize the true nature of the affection, and he attributes this failure to the rarity of this disease. He thinks that the disease occurs about once in 3000 eye cases.

Amongst the cases cited by him there is but one which occurred in this country. This case was reported by Gruening. (ARCHIVES OF OPHTHALMOLOGY AND OTOLOGY, vol. iii.) The concretion was situated in the upper canaliculus and consisted of leptothrix.

A case of tear-stone published by me in the *New York Medical Record*, vol. xxiv., page 289, is not mentioned by Hirschberg. In this case the concretion was found in the lower canaliculus, and also consisted of leptothrix.

The only other American case of which I have found a record was published by Dr. John Dunn, of Richmond, Va. (ARCH. OF OPHTH., vol. xxvi., p. 234). He describes the case as one of mycosis of the lower canaliculus. The microscopical examination of the concretion, made by Ward A. Holden, showed that the micro-organism corresponded in the main with the description of those found by others in concretions in the canaliculi, and formerly considered leptothrix buccalis, but denominated actinomyces by Schroeder. In this case there was no swelling of the canaliculus, but a whitish mass protruded through the

punctum. The case recovered after splitting of the canaliculus and removal of the masses.

I have examined also the reports of a number of eye hospitals, and have found that in 101,000 cases treated in the Newark Charitable Eye and Ear Infirmary, in twenty-two years, only 3 had this affection. In the Brooklyn (N. Y.) Eye and Ear Hospital, 4 cases are reported in a total of 181,729 treated in thirty-two years. Among 9665 eye patients treated in 1901 in the New York Ophthalmic and Aural Institute, none occurred. Not a single case is reported among the 51,229 eye patients treated in the Massachusetts Charitable Eye and Ear Infirmary in 1900 and 1901. Not a single one was found amongst the 31,644 patients treated in the New York Eye and Ear Infirmary last year. I have no other reports at hand. This gives us 7 cases in 375,267 eye patients, or 1 in 53,600.

In the American text-books on eye diseases the affection under consideration is mentioned by Theobald, in *System of Diseases of the Eye*, Norris and Oliver, vol. iii., p. 192. He says that dacryoliths occasionally form in and obstruct the canaliculi, and says that they have been found to consist of leptothrix and streptothrix Foersteri. He does not say that he has seen a case.

Noyes, *Diseases of the Eye*, New York, 1890, p. 272, in describing this affection of the eye, says: "and in a few cases chalky concretions have been found in them. Leptothrix, one of the microscopic algæ, has been found in them."

Williams, *Diseases of the Eye*, Boston, 1869, does not mention the subject.

De Schweinitz, 3d edition, 1898, merely mentions the occasional occurrence of tear-stone, and in all the smaller text-books the subject of tear-stone is hardly referred to.

It would seem from the above that this affection is even more rarely seen here than in Europe.

As regards the fungus found in these concretions, Hirschberg points out that up to 1874 the fungus present in the concretion was reported to have been leptothrix, after that time streptothrix was found in all of the cases, and since

1884 actinomyces has been found present in such concretions. Schroeder, in 1894, expressed the opinion that streptothrix Foersteri was identical with actinomyces; that the conditions for the growth of actinomyces were unfavorable in the canaliculi, and the mildness of the affection was due to this. After this, 8 or 10 cases in which actinomyces was found were described as occurring in Russia and one in Germany, while no cases of leptothrix or streptothrix seem to have been published during the same period. In 1900 Van der Stroehn, in Brussels, published an article on the subject, and pointed out that the fungi of the concrements reminded one of actinomyces, but that the bulbous expansions are less numerous and less marked, and that the clinical picture is different, much less severe. He calls the fungus pseudo-actinomyces.

Exception is taken to this by Axenfeld (*Ergebnisse der allgemeinen Pathologie und pathologische Anatomie des Auges*, Bericht über die Jahre 1897, 1898, 1899, p. 141), who says that he goes too far in designating the fungus "pseudo-actinomyces" without having made a culture. We must first be sure that the actinomyces bovis is entirely out of the question in this locality, and the more so since Roberts holds that actinomycosis may run a very mild course in other parts of the body, such as the tongue, the nose, and the pharynx. In his opinion we had better drop the term actinomycosis of the canaliculi and use the more general designation of streptothrix disease in these cases, until more extensive cultivations have determined the species.

Silverschmidt (*Centralbl. für Bakteriologie*, 1900, p. 486, quoted by Axenfeld) claims to have succeeded in cultivating the fungus in two instances, and in both the growth did not correspond with actinomyces bovis. The growth took place in the absence of oxygen.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

CLINICAL EVENING, MAY 1, 1902.

By C. DEVEREUX MARSHALL, F.R.C.S.

DAVID LITTLE, M.D., PRESIDENT, IN THE CHAIR.

Mr. H. Grimsdale showed a case of **paralysis of the cervical sympathetic.** There was slight enophthalmos, pupil small and reacted very badly. Vision was bare P. L. T — 3. Cocaine had no action on the pupil nor on the eyelid, and there was a gray reflex in the pupil, possibly a detached retina.

Mr. Holmes Spicer thought that a purulent retinitis would explain all the symptoms, and he thought the case was one of those usually called pseudo-glioma. Mr. Grimsdale thought that the failure of the reaction of cocaine proved it to be a paralysis of the sympathetic.

Mr. Grimsdale also showed a case of **congenital unilateral ptosis** in which movements of the eyelid were associated with suction.

Mr. Adams Frost showed a case of **multiple ruptures of the choroid.** This was caused by a blow from the buckle of a belt. Some of the lesions seen were more like hemorrhages than ruptures.

Mr. Rockliffe had recently seen two similar cases, due to a blow with a steel hawser.

Mr. Fisher said that if some of them were hemorrhages they were in the choroid, and that therefore a rupture of some part of the choroid must have taken place in order to produce them.

Mr. Frost also showed a case of an **unusual retinal reflex.** The fundus was unusually dark, and the patient's father had

retinitis pigmentosa. Mr. Frost looked upon this case as physiological.

Mr. TREACHER COLLINS showed a case presenting **unusual opacities in the central part of each cornea.** The patient was a carman, aged thirty-three, whose sight had been failing for two years. There had never been any real keratitis, but in the central part of each cornea are numerous white radiating lines of opacity; the periphery of the cornea is quite clear. Mr. Collins thought that these opacities were in the anterior layers of the substantia propria and were due to infiltration and degeneration with small calcareous deposits.

Mr. BRONNER thought they were very superficial and might be scraped.

Mr. LAWFORD had a somewhat similar case in a woman, aged twenty-one, who has had recent ulcerative keratitis. This has given rise to a central corneal opacity without injection, but with great photophobia. He scrapes the cornea, and this is now being examined bacteriologically. He suggested that this might be done in the present case.

Mr. L. V. CARGILL on a case of **corneal opacity after instrumental delivery.** The case was a difficult *brow* presentation, in which great force had been used with the forceps. The condition was clearing, and only a slight band of opacity now remained across the cornea.

Mr. G. W. THOMPSON on a case of **obliteration of a retinal artery following attacks of temporary amblyopia.** The patient is a woman who for the last ten years has suffered from severe headaches with temporary loss of vision. In September last she had an attack from which the vision has never properly recovered, the dimness she then noticed persisting to some extent. As a rule the vision returns after the attack has passed off. The disc is now partially atrophied.

Mr. LAWFORD thought this represented a most important class of case, seeing how common temporary loss of vision is in association with migraine, and how seldom it is that ophthalmoscopic changes are seen in connection with it. Some of them may be caused by spasm of the vessels which leaves the artery no less *patent* than it was before. He had recently had under his care a man aged thirty-five, who habitually overworked himself and who, after being much underfed during Lent had developed *dimness* in the right eye, which has persisted. For many years he has had tem-

porary attacks of *dimness*, but now there is partial obliteration of one of the retinal arteries with hemorrhages, and at other places are seen old changes which apparently indicate lesser lesions of a similar nature in times gone by.

Mr. A. H. THOMPSON asked if it were a case of endarteritis obliterans, as he hardly thought spasm would last for so long a time.

Dr. JAMES TAYLOR thought that this case was similar to cases of temporary loss of function of some portion of the brain. This sometimes leads to permanent changes.

Mr. R. D. BATTEN described a somewhat similar case.

Mr. ROLL drew a parallel between this condition and Renaud's disease.

Mr. FISHER thought the tendency of opinion was that arterial degeneration was always present. This he did not consider was the case.

Mr. THOMPSON in reply was inclined to the opinion that there was endarteritis present.

Dr. BRONNER showed some sections of a **conjunctival lipoma in an infant.**

Mr. ROCKLIFFE. A case of very rapidly recurring **glioma of the orbit.**

Mr. LANG showed a child whose orbit had been wounded with a pitchfork. The ophthalmoscope showed a white patch of exudation where the disc should be, and he thought that the optic nerve was torn across close behind the globe.

REPORT OF THE MEETING OF THE OPHTHALMOLOGICAL SECTION OF THE NEW YORK ACADEMY OF MEDICINE, HELD ON MONDAY EVENING, MAY 19, 1902.

By Dr. HENRY H. TYSON, Secretary.

DR. FRANK H. LEWIS, CHAIRMAN PRO TEM.

Dr. G. H. Cocks read a report of a case of **sarcoma of the iris.** He gave the following history of the case: Miss W., aged forty-five, had her eyes examined by him on January 2, 1897, and complained of difficulty in reading. Had never worn glasses. Vision R $\frac{20}{30}$, with — 0.50 sph. $\frac{20}{20}$; L $\frac{20}{30}$, with — 0.75 sph. $\frac{20}{20}$. He found with oblique illumination that the iris of the left eye did not respond in all portions equally to light, the inner one third being inactive while the other two thirds responded readily. The inner third of the iris was pushed forward so that it was almost in contact with the cornea. Situated in this portion of the iris was a black pigmented mass extending to the margin of the pupil. Under atropine solution gr. xvi–℥i the pupil dilated irregularly. The tumor was not connected in any manner with the lens. A few opaque striæ were seen in the lens immediately behind the tumor. The apparent origin of the tumor was from the posterior surface of the iris. The fundus was normal. He prescribed + 1. D for reading, and informed the patient as to the growth in her eye, and suggested that she consult Drs. Callan and Noyes in regard to the malignancy of the tumor. Both surgeons diagnosed the tumor as a melanosarcoma, and advised enucleation of the eyeball as the safest procedure. On account of the good vision in the eye, $\frac{20}{30}$, she declined to have the eye enucleated but promised to have the eye observed at frequent intervals. June 19, 1897: Appearance of tumor had not changed. Striæ in the lens appeared more numerous but not enough to interfere with vision

which was the same as when first examined. Patient was again examined in December, 1897 and 1898, when she noticed a slight but perceptible increase in the size of the tumor, but it did not encroach upon the pupil. The patient was again examined on May 16, 1902, when she stated that she had experienced no pain nor inconvenience in the eye since her visit three and a half years ago. He found the tumor had extended so that one fourth of the undilated pupil was obscured by it. The appearance of the lens and her vision was about the same as that of the examination of December, 1898. Her general health was good and she reads Jaeger No. 1 comfortably with + 1.5 D.

Dr. C. J. KIPP referred to a case of **primary sarcoma of the iris** which he removed by an iridectomy twenty-six years ago (*Vide* ARCHIVES OF OPHTH. AND OTOL., vol. v., No. 1, 1876). He stated that since then several cases had been reported, but in all, the eyes were enucleated. His case was the first one in which the growth was removed by an iridectomy.

Dr. C. J. KIPP read a report of a case of **dacryolith.** Report of case published in full in this number of the ARCHIVES.

Dr. C. J. KIPP read a report of a case of **blennorrhœa of the sac caused by a rhinolith.** Report of the case published in full in this number of the ARCHIVES.

Dr. WILSON stated that he had seen two cases of rhinolith. In one case the nucleus was a leaf, while in the other it was a bean. One case had been treated for years previously for ordinary catarrh by a general practitioner. In the case in which the leaf formed the nucleus it had caused a blennorrhœa of the sac, while in the other case no blennorrhœa was associated with it.

Dr. J. WOLFF presented a case of **migraine ophthalmoplegique** (Charcot).

The patient had a paralysis of the abducens. The history of the case was that the child was attacked four weeks ago by migraine which was followed by the paralysis. During the past three years the child has had four attacks, always of the same character, right-sided hemicrania, nausea, and vomiting, lasting two or three days; with the subsidence of these symptoms the paralysis sets in suddenly and completely and lasts four or five weeks and then passes off. The first attack occurred when the child was one and one half years old. Intervals between attacks vary and each successive one seems to leave the muscles weaker, as it requires a longer interval for the muscles to recover. He considered it a

recurrent paralysis of the sixth nerve, which is rare, as the majority of cases reported have been paralysis of the third nerve. He cannot account for the cause of the affection. Treatment consisted of tonics, bromides, etc., all of which seemed to produce no effect. Vision is normal and child otherwise was perfectly well.

Dr. LESZYNSKY stated that he had seen four cases of recurrent ophthalmoplegia, but the third nerve was involved in all the four cases. He had never seen one in which the sixth nerve was involved. In quite a number of the cases the paralysis remains permanent. As to the pathology in these cases he found only two cases on record in which post-mortem examinations had been made and localized lesions found; the patients having died from other causes. In both of these cases a lesion was found in the third nerve at the base of the brain. Others have died, having had recurrent ophthalmoplegias during life, in which no lesions were found to account for the affection. Some observers consider it of nuclear origin, while Spitzka's theory is, that there is an obstruction in the foramen of Monroe during the involvement, which produces engorgement of the vascular tissues which press upon the third nerve.

Dr. C. J. KIPP stated that he had seen several cases in which the third nerve had been involved; one case in a woman who had a recurrent ophthalmoplegia with each pregnancy. He had never before seen a case involving the sixth nerve.

Dr. WOLFF remarked that he had found a statement to the effect that cases in which the sixth nerve had been affected had occurred, but no description of individual cases could be found.

SYSTEMATIC REPORT ON THE PROGRESS OF OPHTHALMOLOGY IN THE THIRD QUARTER OF THE YEAR 1901.

(*Conclusion.*)

By Prof. ST. BERNHEIMER, at Innsbruck; Dr. O. BRECHT, Prof. R. GREEFF, Prof. C. HORSTMANN, and Dr. R. SCHWEIGGER, in Berlin;

WITH THE ASSISTANCE OF

Dr. G. Abelsdorff, Berlin; Prof. E. Berger, Paris; Dr. A. N. Alling, New Haven, Ct.; Dr. Dalén, Stockholm; Dr. J. Herrnheiser, Prague; Prof. Hirschmann, Charcow; Dr. J. Jitta, Amsterdam; Dr. Krahnstöver, Rome; Mr. C. Devereux Marshall, London; Dr. P. von Mittelstädt, Metz; Prof. Da Gama Pinto, Lisbon; and others.

Translated by Dr. Ward A. Holden.

XII.—CORNEA, SCLERA, ANTERIOR CHAMBER.

448. **Hosch.** A contribution to our knowledge of the congenital affections of the cornea. *Graefe's Archiv*, lii., 3, p. 490.

449. **Stock.** A further contribution to bilateral congenital melanosis of the cornea. *Klin. Monatsbl. f. Augenheilk.*, xxxix., p. 770.

450. **von Hippel.** Some rare anomalies of the eye. Unilateral parenchymatous opacity of the cornea, anterior synechia with perforation of the cornea, and bilateral symmetrical coloboma of the choroid upward in a newborn infant. *Graefe's Archiv*, lii., 3, p. 473.

451. **Sachsalber.** On hyaline degeneration of the cornea. *Beiträge z. Augenheilk.*, 48, p. 1.

452. **Stood.** On recurrent bullous keratitis and keratalgias after injury of the surface of the cornea. *Arch. f. Augenheilk.*, xliii., 4, p. 220.

453. **Fuchs.** On circular and disc-shaped keratitis (keratitis annularis et disciformis). *Klin. Monatsbl. f. Augenheilk.*, xxxix., p. 513.

454. **Masugi.** Experimental investigations on the process of recovery in

perforating and non-perforating wounds of the cornea, with special reference to the action of cocaine. *Klin. Monatsbl. f. Augenheilk.*, xxxix., pp. 634 and 731.

455. **Ischreyt.** On foreign bodies of the cornea. *St. Petersburger med. Wochenschr.*, 1901, No. 40.

456. **Badal.** Three cases of keratoconus. The immediate and later results of surgical intervention. *Arch. d'opht.*, xxi., 8, p. 433.

457. **Altland.** Two cases of precorneal tumor after episcleritis. *Archiv f. Augenheilk.*, xliv., 1, p. 42.

458. **Bürstenbinder.** A shot remaining eight years in the anterior chamber. *Graefe's Archiv*, lii., 3, p. 476.

459. **Ball.** A brief note on aspergillus keratitis. *Amer. Medicine*, July 6, 1901.

Hosch (448) made a microscopic examination of the eyes of a syphilitic infant that died immediately after birth. The corneas were cloudy, the left densely so, and in it cells and vessels were found; the membrane of Descemet was bare, and in contact with lens masses, the anterior capsule being absent. There was also a marked inflammation of the uvea. The condition of the cornea was not a malformation since the cornea and sclera were perfectly differentiated, and Hosch explained it by supposing that the early inflammatory process had affected particularly the entering mesoblastic tissue, and thus prevented the normal development of the posterior layers of the cornea, the anterior chamber, the iris, and the anterior capsule.

Stock (449) believes it probable that in all the cases recorded the brown pigmentation of the posterior surface of the cornea was a congenital anomaly. Deposits on Descemet's membrane of iridic origin disappear in time. Stock now reports two new cases of very myopic eyes, free from irritation, with the stippling in the form of a vertical oval. In one patient the iris was gray, as were also the points on the cornea and points on the anterior capsule —remains of the pupillary membrane. Stock believes that these points represent the congenital remains of iris tissue on the posterior surface of the cornea, which, when the iris becomes brown, become colored also, but otherwise remain gray.

In the new-born child observed by von Hippel (450), the cornea exhibited an extensive parenchymatous opacity and a dull surface without any loss of substance, but after the instillation of fluorescin there appeared a pronounced greenish color in the depth of the cornea and the endothelium, from which a filament extended to the iris as an anterior synechia. The synechia was broken with

atropine, and the endothelium healed. There was then discovered a symmetrical coloboma of the choroid which was taken to be of inflammatory origin.

The anterior synechia was explained as being due to an adhesion between the iris and the region of the cornea that was denuded of endothelium through flattening of the anterior chamber during a prolonged labor.

From his extensive investigations on hyaline degeneration of the cornea in eyes with secondary glaucoma and eyes with degenerating corneal staphyloma, SACHSALBER (451) draws the following conclusions. Besides the ordinary epithelial degeneration, tracts of horny cells extending into the depth are found which form hyaline concretions and later become calcified. In the degeneration of staphylomas quantities of elastic fibres appear in the corneal margin, sclera, and conjunctiva, which later undergo hyaline degeneration. Hyaline concretions were found in the iris also.

STOOD (452) in his paper of a year and a half ago describes the recurrent formation of vesicles after erosions of the cornea which recently has been discussed by Szili, Reuss, and Schoeler. The injury is usually done by a foreign body passing tangentially over the cornea. After awakening from sleep the vesicle is broken and severe pain results. He recommends the use of a salve in the eye at night and massaging the cornea with a salve in the morning before the eye is fully opened. With this treatment the painful bullous keratitis is prevented.

While Vossius' annular keratitis is a variety of parenchymatous keratitis, FUCHS (453) believes that other ring and disc forms of keratitis belong in the category of abscessus siccus, for which Fuchs wishes to introduce the name keratitis disciformis. Disc-shaped keratitis is closely related to serpent ulcer and appeared frequently after loss of epithelium from injury or herpes, mostly in the middle of the cornea. The surface of the cornea is dull but about of the normal level. It rarely ulcerates and a dense opacity remains. The gray margin of the disc is very pronounced, sometimes appearing doubled, and under a glass it is seen to consist of points and small lines. At times there is iritis with deposits on Descemet's membrane or hypopyon. The course is always mild but tedious and the duration is at least three to four weeks. Often the pain is more disturbing to the patient than the diminution of vision. Atropine and moist warm applications accomplish

as much as anything, unless the galvano-cautery is required, which, however, leaves dense scars. The vascularization of the cornea is slight during the course of the disease.

As regards the classification of corneal inflammations, which always is more or less artificial and arbitrary, Fuchs calls attention to the fact that ectogenous infections mostly have but one point of entry from which they spread out centrifugally and usually lead to suppuration, while the morbid products of constitutional diseases passing through the blood- or lymph-vessels into the cornea mostly produce multiple foci of inflammation scattered over the cornea, which have a tendency to tissue destruction.

MASUGI (454) comes to the conclusion that muriate of cocaine causes changes in the epithelial cells of the cornea and disturbs nuclear division by extracting water from the cell substance and perhaps exerting a certain toxic effect. Thus the epithelium dips into the canal of a wound more slowly when cocaine is used than when it is not. Cocaine, however, does not delay the primary closure of the lamellæ nor the formation of the fibrin plug, these processes depending solely upon the size of the wound.

ISCHREYT (455) in statistics of 461 foreign bodies of the cornea finds that the majority lodge in the centre of the cornea, and the next greater number in the lower-inner sector. When they have injured Bowman's membrane a permanent macula later marks their location.

BADAL'S (456) three cases of keratoconus operated on several years ago have resulted very favorably. In the first case, bilateral iridectomy made sixteen years before produced so good a correction without glasses that the patient became a teacher. In the second case, in which iridectomy was done ten years before, strong sphero-cylindrical glasses had to be worn. In the third case, in which iridectomy had not sufficed, a horizontal excision of the apex of the cone was practised after the introduction of three sutures, a proceeding that the author uses for partial cicatricial staphyloma also.

The iridectomy, which he regards as the important feature, acts by reducing the tension and by exposing a portion of the cornea better adapted for visual purposes. Excision should be done only when iridectomy is unsuccessful.

v. MITTELSTÄDT.

ALTLAND (457) discusses the question as to the etiology of carcinoma, in connection with two cases of episcleritis at the limbus

leading to the formation of tumors. His Case 2 had previously been described by Manz. The episcleritis recurred frequently for three or four years and the inflammatory process extended into the cornea producing a vascularized marginal opacity. The epithelium over these parts finally proliferated also, and in one case a papilloma developed, in the other a carcinoma. Altland regards chronic episcleral inflammation as predisposing to the development of tumors.

A supplementary note by Baas shows that in the first patient a year later an extensive recurrence had taken place and it was quite probable that the growth was malignant as it consisted more of solid cones and nests of epithelial cells. Again a severe inflammation had occurred and Baas regarded this as the exciting cause of the malignant neoplasm.

BÜRSTENBINDER (458) reports the condition of an eye in which a lead shot had remained for eight years in the anterior chamber without leading to further trouble. He collected from the literature eighteen cases in which the foreign body remained harmless in the anterior chamber. In general he regards such a condition as an unsafe one and recommends operation.

BALL (459) describes a case in which he found a corneal ulcer with a small soft black mass lying in its base. This proved to be made up of the mycelial threads and spores of Aspergillus.

ALLING.

Sections XIII.–XVIII. Reviewed by DR. O. BRECHT, Berlin.

XIII.—LENS.

460. **Dimmer.** Contributions to the extraction of cataract. *Zeitschr. f. Augenheilk.*, vi., p. 93.

461. **Straub.** Cataract operations with and without iridectomy. *Med. Tydschr. v. Geneesk.*, 1901, ii., No. 4.

462. **Bondi.** The indications for operation in senile cataract. *Wien. med. Presse*, 1901, No. 30.

463. **Terrien.** The operation for cataract. *Arch. d'opht.*, 1901, p. 323.

464. **Pope.** On cataract operations in India. *Centralbl. f. prakt. Augenheilk.*, xxv., p. 257.

465. **Rollet.** Cataract and dacryocystitis. *Clin. Ophthal.*, vii., 14, p. 215.

466. **Mitsiyasu, Inouye.** A case of cataract arising in the course of malaria. *Ophth. Klinik*, 1901, p. 161.

467. **Szentirmai.** Spontaneous expulsion of the lens from the eye after coughing. *Orvosi Hetilap*, 1901, No. 35.

468. **Majewski.** On the agents which influence the degree of corneal astigmatism after cataract operation. *Ann. d'ocul.*, cxxvi., p. 92, 1901.

469. **Fergus, Freeland.** Three operations for cataract extraction in septic conditions. *Ophth. Review*, Sept., 1901.

470. **Schneideman.** A case of spontaneous couching of a congenitally dislocated lens. *Ophth. Record*, 1901.

DIMMER (460) reports on the cataract operations he has made in the last four and a half years and speaks in detail of the antiseptic preparation. He gives special attention to trimming the lashes and even the eyebrows, the disinfection of the instruments, the operative procedure, and the after-treatment. He believes in the open treatment of the wound. In 158 extractions without iridectomy there was prolapse in 17 cases, or 10.8 per cent. In a total of 361 extractions in uncomplicated cases there was infection of the wound in 3, or 0.83 per cent. The eye was lost from choroidal hemorrhage in 4 cases, or 1.1 per cent.

In the beginning STRAUB (461) made all his extractions without iridectomy, but he has now come to the general view that some cases should be operated with and some without iridectomy.

The disadvantages of the operation without iridectomy are the danger of prolapse and the danger of consecutive glaucoma, the latter perhaps being due to the use of mydriatics. Furthermore, the after-treatment is more prolonged than with the combined operation. In nervous persons the danger of prolapse is greater, and iridectomy is preferable in such cases. JITTA.

POPE (464) in Madras operates every year on one thousand cataracts in the hospital and two hundred in private practice. Good results (satisfactory vision for distance and near with glasses) are obtained in 92 per cent. He performs discission before the flap extraction, and does not make an iridectomy.

MAJEWSKI (468) reports the results of his extensive studies of corneal astigmatism after cataract operation made under Professor Wicherkiewicz's direction by means of Javal's ophthalmometer. Soon after the operation the astigmatism is often 10. D or even 15. D. He found, in agreement with Laqueur, Raymond, and others, that the operative astigmatism was less, the more peripheric the section. When a conjunctival flap is made which helps the adaptation of the cut surfaces the astigmatism is slight, but complications leading to separation of the lips of the wound cause a higher degree of astigmatism. Thus after prolapse of vitreous an average astigmatism of 14.25 D was found, after incarceration

of the iris 10.28 D, ten days after the operation. Extraction with iridectomy produced less astigmatism than extraction without. In 288 cases the principal meridians were oblique in 244.

FERGUS (469) gives the notes of three cases in which he has removed cataracts under various septic conditions. In the first case, the patient was an elderly lady who had **nasal polypi.** An examination of the conjunctiva showed only xerosis bacilli. The extraction was performed on June 5th, and everything went well as far as the eye was concerned, but the patient died on the 17th from septicæmia arising from the nose. There was suppuration in the sphenoidal sinus but no meningitis.

In another case suffering from **dacryocystitis,** he first dissected out the sac and then extracted the lens. The case did well.

In the third case, pyogenic organisms were found in the conjunctival sac, also polypi in the nose and suppuration in the antrum. This was treated and the recovery after extraction was perfect.

The author lays great stress on the importance of a bacteriological examination being made of the conjunctiva, and also suggests that the various sinuses should be habitually examined before operating on cataract patients. MARSHALL.

SCHNEIDEMAN (470) reports a case in which a cataractous lens, previously partially dislocated into the anterior chamber, completely disappeared from the pupillary area into the vitreous.

ALLING.

XIV.—IRIS.

471. **Berens.** Primary sarcoma of the iris. *Ann. d'ocul.*, cxxvi., p. 71.

472. **Lommel.** Congenital anomalies of the iris. *Inaug. Dissert.*, Giessen, 1901.

473. **Falckenberg.** A contribution to the pathology and therapy of tuberculous iridocyclitis. *Inaug. Dissert.*, Tübingen, 1901.

474. **Sweet.** Rupture of the iris from contusion of the eyeball. *Ophth. Record*, July, 1901.

LOMMEL (472) found among 35,000 patients, seen in ten years in Giessen, 132 eyes, or 0.37 %, with remains of pupillary membrane and deposits on the capsule with or without filaments running to the iris.

FALCKENBERG (473) reports 3 cases of severe tuberculosis of the anterior portion of the uveal tract with but slight involvement

of the posterior segment. In 1 case there was tuberculosis of the joints and bones, in the others no extraocular signs. In 2 cases injections of Koch's tuberculin were made, with effect upon the eyes, and enucleation was necessary. Both patients soon died of meningitis. The patient not treated with tuberculin remained in good health for five years.

SWEET (474) reports 3 cases as follows: Case 1. Pupil dilated and fixed, with one large rupture at the pupillary margin of the iris, extending downward and outward; five small tears at the pupillary edge and two radial ruptures in the continuity of the membrane at its lower portion. Case 2. Pupil dilated and oval. Small tears at the pupillary border. Case 3. Large and small ruptures of the iris at the temporal side of the pupillary border. ALLING.

XV.—CHOROID.

475. **Kunz.** Three cases of tuberculosis of the uvea, with special reference to their anatomical extension. *Klin. Monatsbl. f. Augenheilk.*, xxxix., p. 531.

476. **Hirschberg.** A case of choroidal tumor with remarkable peculiarities. *Centralbl. f. prakt. Augenheilk.*, xxv., p. 229.

477. **Fuchs.** Demonstration of preparations of an incipient melano-sarcoma of the choroid. *Arch. f. Augenheilk.*, xlii., p. 238.

478. **Duane.** Simultaneous rupture of the choroid and paretic mydriasis, without paresis of accommodation. *Ophth. Record*, Aug., 1901.

KUNZ (475) reports two cases of tuberculosis of the iris and one of the choroid. In the latter case, only the posterior portion of the choroid was affected. The growth had extended through the sclera and along the optic nerve, but had not extended into the overlying retina. Tubercle bacilli were found.

HIRSCHBERG (476) reported a case of rapidly growing melanotic sarcoma of the choroid. The "remarkable peculiarities" consisted in the procedure that would have occurred to any ophthalmologist, to make vision as perfect as possible in the second eye before the first was enucleated. This was accomplished in Hirschberg's case by tattooing a leucoma and making an optical iridectomy.

The interesting features of the case of DUANE (478) are the occurrence of two ruptures meeting at an obtuse angle, one being horizontal, and the co-existence of paralytic mydriasis without visible laceration and not accompanied by paresis of accommodation. The vision was normal. ALLING.

XVI.—VITREOUS.

479. **Holden.** Plugging of an inferior papillary artery looped forward into the vitreous. *Klin. Monatsbl. f. prakt. Augenheilk.*, xxxix., p 792.

480. **Ridley.** Hemorrhage into the vitreous. *Ophth. Review*, Aug., 1901.

Following the report by Baer of a case of embolism of the central artery in an eye with an arterial loop projecting from the disc into the vitreous, HOLDEN (479) reported a case, seen with Claiborne, who first described it, in which a similar double loop projected forward from a papillary artery, vision then being normal. When seen again by Holden, several months later, in Claiborne's absence, the patient had a superior hemianopsia with normal central vision, and a plugging of the looped artery was found, proving that it was, as he had previously supposed, the true inferior papillary artery. This looped condition has been observed but a few times, and it seemed more than a coincidence that in two of these rare cases there should have occurred plugging of the central artery or of the looped branch, the inference being that such anomalous vessels are especially susceptible to disease of their walls.

RIDLEY (480) points out that there are two sources of hemorrhage into the vitreous, one arising from the retinal and one from the ciliary vessels. Hemorrhage from the ciliary vessels is likely to produce more serious results than that from the smaller retinal vessels. He classifies the cases into four groups: 1. Traumatic. 2. Due to some general disease. 3. Occurring in high myopia. 4. As a complication of glaucoma. Under favorable conditions, he says, the effusion will be absorbed, and, although the condition is serious enough, yet with care many cases do well. He advocates rest, dark glasses, sometimes keeping the patient in bed for some weeks; weak atropine locally (except in the glaucomatous cases), and iodide of potassium internally. MARSHALL.

XVII.—GLAUCOMA.

481. **Terrien** and **Petit.** Enormous congenital excavation of the disc. *Arch. d'opht.*, xxi., 7, p. 405.

482. **Terson.** On the nature of glaucoma. *Ann. d'ocul.*, cxxvi., p. 22.

483. **Terson.** Glaucoma consecutive to albuminuric retinitis. The marked analgesic effect of dionine. *Bull. de la Soc. d'opht. de Paris*, July 2, 1901.

484. **Gasparrini.** On some cases of posterior glaucoma consecutive to neuritis. *Ann. di ottalm.*, xxx., 4.

485. **Grönholm.** On the cause of the narrow anterior chamber in primary glaucoma. *Finska Läkare-Sällsk. Handl.*, April, 1901.

486. **De Wecker.** The value of iridectomy in glaucoma. *Mém. et bull. de la soc. fr. d'opht.*, 1901, pp. 1–184.

487. **Wicherkiewicz.** Some words on the medicamentous treatment of glaucoma. *Klin. Monatsbl. f. Augenheilk.*, xxxix., p. 554.

488. **Angelucci.** The effects of sympathectomy and its application in the treatment of glaucoma. *Arch. di ottalm.*, viii., 5–6.

489. **von Hippel, E.** On the pathological anatomy of glaucoma, with remarks on pigmentation of the retina proceeding from the vitreous. *Graefe's Arch.*, lii., p. 498.

490. **v. d. Hoeve.** Remarks on a case of malignant glaucoma. *Ned. Tijdschr. v. Geneesk.*, 1901, ii., No. 13.

491. **Whitehead.** The treatment of glaucoma by excision of the superior cervical ganglion of the sympathetic. *Lancet*, July 6, 1901.

TERRIEN and PETIT (481) found in a very myopic squinting eye in a girl of seventeen an extraordinarily deep excavation of the entire pupil, which was surrounded by an atrophic choroidal ring. The excavation measured 24 D, and as there were no signs of inflammation it was regarded as congenital, but not as a coloboma, because the entire disc was involved.

v. MITTELSTÄDT.

TERSON (482) compares the pathogenesis of acute attacks of glaucoma with that of acute œdema of the lung. In a number of cases the hypersecretion of intraocular liquid is to be referred to a toxic excitation of the vasomotors (influenza, rheumatism, intoxications from the alimentary canal, etc.). BERGER.

TERSON'S (483) patient had had double albuminuric retinitis for a year, and then had bilateral retinal hemorrhages, which in one eye led to glaucoma with great pain and amaurosis. When miotics and a posterior sclerotomy were without effect he used instillations of dionin 1:40 several times a day, and in a few hours the pain ceased permanently. BERGER.

From three cases in which glaucoma followed a neuritis, which through proliferation blocked the posterior lymph passages GASPARRINI (484) believes that inflammations of the optic nerve may be a frequent cause of glaucoma. KRAHNSTÖVER.

It is generally believed that the narrowing of the anterior chamber in glaucoma is due to the increase in tension. GRÖNHOLM (485) had demonstrated this in an experimental way. He raised the tension in the vitreous of living and dead cats and rabbits to 10, 25, 50, and 100 *mm* Hg., maintaining this for periods ranging from fifteen minutes to five days, and measuring the depth of the anterior chamber by various methods. The results

were as follows: Increased tension in the vitreous causes in a dead rabbit's eye a pressing forward of the ciliary portion of the iris, but not of the pupillary margin; in the living rabbit the ciliary portion is not displaced by less than 75 *mm*, a lesser pressure being neutralized by the tonic tension and contractility of the iris. The pupillary margin, the lens, the ciliary processes, and the zonula are not displaced forward by the pressure of liquid in the vitreous either in the dead or the living eye.

The fact that the root of the iris is forced forward shows that the tension in the anterior chamber can be, at least temporarily, lower than that in the posterior. The pressure in the anterior chamber can only be lower than that in the posterior when an obstruction is offered to the passage of liquids through the pupil. When an artificial opening is made connecting the posterior and anterior chambers, the iris is not pushed forward. The reason that the lens is not pushed forward is probably that the liquid finds no resistance in the circumlental space. The increased tension in the vitreous can not, therefore, be the sole cause of the displacement of the lens in glaucoma.

In inflammatory glaucoma the ciliary processes are greatly swollen and displaced forward. In order to learn whether this displacement could not be the cause of the displacement of the lens, the author, by tying the venæ vorticosæ, caused a swelling of the ciliary body and a displacement forward of the lens. When he burned the upper half of the limbus, he produced a partial swelling of the ciliary body, and the equator of the lens was pushed forward on this side. The swelling of the ciliary body thus seems to cause the displacement of the lens in glaucoma. The author believes that the cause of inflammatory glaucoma lies in a dilatation of the blood-vessels of the ciliary processes, which causes swelling of the ciliary body, hypersecretion of the ocular liquids, increased tension, displacement of the root of the iris, and finally retention of the aqueous humor. DALÉN.

In a monograph of 184 pages DE WECKER (486) has collected the views of various authorities as to the value of iridectomy. To his surprise he found that most ophthalmologists used operative treatment in glaucoma simplex. He calls attention to the great difficulty of making the differential diagnosis between glaucoma simplex and pseudo-glaucoma. De Wecker treats chronic inflammatory glaucoma by means of sclerotomy, followed by iridectomy. He lays the chief importance of the latter operation in the

production of a filtration scar, which, however, can form only in eyes with increased tension. Malignant glaucoma is that form in which iridectomy rapidly leads to failure of vision. Exceeding narrowness of the anterior chamber is a characteristic of these cases, and they are mostly of slight intensity. A sad example of this form was the case of Javal, whose second glaucomatous eye was treated by posterior sclerotomy and subsequent iridectomy. The acuteness of vision before operation was relatively good. After the iridectomy, the wound long remained open and the iris lay closely upon the cornea.

In chronic simple glaucoma WICHERKIEWICZ (487) recommends as a sovereign remedy, and in acute attacks as an abortive remedy, the following solution: Eserin sulph. 0.01, pilocarpin hydrochlor. 0.2, coc. hydrochlor. 0.1, aq. dest. 10.00, to be dropped into the eye in the evening, and, if necessary, in the day also.

ANGELUCCI (488) observed, after dividing the cervical sympathetic, not only a widening of the lumen but also an œdema about the arteries and changes in the protoplasm of the unstriped muscular fibres in the vessel walls. The opposite condition followed section of the 5th pair. Excitation of the motor branch of the cervical sympathetic increases the first dilatation of the pupil and the refraction becomes less. Section or removal of the superior cervical ganglion can have a favorable effect upon glaucomatous symptoms if it is conceded that they are dependent upon these nervous influences.

In two cases the author obtained a marked improvement in chronic glaucoma but he is doubtful as to the permanent results.

KRAHNSTÖVER.

v. HIPPEL (489) examined two glaucomatous eyes. The first was enucleated for pain three weeks after the onset of an acute glaucoma. Puncture and eserine were of no avail. We are not informed why iridectomy was not done. In the other case there was secondary glaucoma after traumatic luxation of the lens in an eye with retinitis pigmentosa of long standing. In both eyes Schlemm's canal was open and filled with blood but the trabeculæ between it and the anterior chamber contained numerous pigment cells which had come from the anterior segment of the uveal tract. In the first case the iris was in its normal position, the angle of the chamber open. Round pigmented cells were found over the entire anterior surface of the iris, in the iris, between the zonula fibres and the ciliary processes, and on the inner surface of

the retina and the disc. In the retina they lay mostly above the vessels, but extended in narrow tracts to the outer nuclear layer.

The author considers it probable that the infiltration with pigment when it has exceeded a certain grade may interfere with secretion and lead to increased tension, thus in many cases causing glaucoma that is not relieved by sclerotomy or miotics. The pigmentation of the inner layers of the retina, coming from the vitreous, suggests a pathological current established after the blocking of the anterior lymph channels. In the second case there was unilateral total degeneration of the retina with excessive pigmentation of all layers, the usual condition in true retinitis pigmentosa. Since the vessels of the choroid and ciliary body were normal and there was no syphilis the cause cannot be determined.

WHITEHEAD (491) records the case of a man whose left eye was injured by the bursting of a soda-water bottle. The wound healed, but ten months later his eye became severely inflamed and when seen the other eye had severe sympathetic inflammation with tension +3. The injured eye being blind was removed. Paracentesis did no good, and two attempts at iridectomy failed owing to the firm adhesion of the iris to the lens capsule. Sclerotomy also failed to reduce the tension and the vision was reduced to counting fingers at six inches.

The superior cervical ganglion was then removed with the immediate effect of reducing the tension to +½. It again rose to +2 but fell of its own accord to +½ two days later and the vision improved to counting fingers at 18 inches. The pupil was quite unaffected owing to the firm adhesions.

Mr. Whitehead remarks that in this case it was clear that the contraction of the pupil not occurring it clearly had no influence on the tension and that the control of the sympathetic on the circulation and nutrition of the uveal tract is the thing of great importance. It is well known that an alteration of quality of the intraocular fluid in cases of serious iritis may lead to increase of tension in spite of a widely open angle, and here apparently the abolition of the control of the sympathetic over the vascular apparatus and secreting epithelium so altered the constitution of the intraocular fluid that the tension became reduced.

He thinks that for ordinary cases iridectomy is still the best operation, but if this has failed sympathectomy holds out some hope of relief. MARSHALL.

XVIII.—SYMPATHETIC OPHTHALMIA.

492. **Gasparrini.** A second experimental and clinical contribution to the knowledge of sympathetic ophthalmia. *Ann. di ottalm.*, xxx., 4, p. 285.

493. **Gasparrini.** On sympathetic ophthalmia, experimental researches. *Atti d. R. An. d. Fisiocritici*, iv., vol. xii.

494. **Bellarminoff** and **Selenkowski.** New investigations on the pathogenesis of sympathetic ophthalmia. *Arch. f. Augenheilk.*, xliv., p. 1.

According to GASPARRINI (492), the transference of micro-organisms from one eye to the other by way of the general circulation is out of the question; toxines only could pass in this manner. Injections of diphtheria bacilli in rabbits caused irritation of the other eye quite similar to the sympathetic ophthalmia of man. The transference here was through the lymph channels of the optic nerve and its sheaths, there being a general poisoning of the circulation. The kidneys excrete the poison while the quantities that reach the other side through the lymph channels along the chiasm cause the sympathetic disturbance. This view is supported by two clinical observations of sympathetic ophthalmia in which the toxicity of the urine was related to the violence of the sympathizing eye, while in the neuritis of patients with kidney disease the contrary takes place, *i. e.* the faulty excretion of the toxic substances through the urine is the cause of the inflammation.

A number of animal experiments in which subcutaneous injection of diphtheria toxin, while one eye was irritated chemically, mechanically, or electrically, never led to a localization of the general infection either in the irritated or the other eye, made him think that one could not suppose a nervous predisposition rendering the eye more susceptible to the effect of the general infection to be the cause of sympathetic ophthalmia. The author hopes to continue these experiments with other bacteria and toxines.

KRAHNSTÖVER.

GASPARRINI (493) by injecting diphtheria bacilli into one eye caused sympathetic neuritis and retinitis in the other. The main difficulty lay in the necessity of inducing a mild local inflammation without causing the prominent general symptoms of diphtheria. The bacillus could not be found in either optic nerve or in the vitreous of the sympathizing eye.

KRAHNSTÖVER.

BELLARMINOFF and SELENKOWSKI'S (494) paper consists of three parts. In the first they discuss the existing theories of

sympathetic inflammation critically, with the result that to them none of the five existing hypotheses is satisfactory. The same may be said of the second part, in which they report their reproduction of the experiments. In the third part they advance a toxin theory. They worked with the toxin of staphylococcus aureus of a determined virulence and made three series of experiments on rabbits and dogs: introduction of the toxin (1) into the peripheral end of the cut optic nerve near the foramen opticum, (2) into the subdural space of the optic nerve close behind the ball, and (3) into the posterior portion of the vitreous. Among 34 of the experiments in classes 2 and 3 they obtained in 12 cases a sympathetic ophthalmia similar to that seen in man.

Sections XIX.–XXII. Reviewed by PROF. GREEFF, Berlin.

XIX.—RETINA AND FUNCTIONAL DISTURBANCES.

495. **Römer.** Calcification of the retina in chronic nephritis. *Graefe's Archiv*, lii., 3.

496. **Nohl.** On quinine amaurosis. *Beiträge z. Augenheilk.*, 48.

497. **Beaudoux.** A case of commotio retinæ from contrecoup with persistent blindness resulting in complete recovery. *Ophth. Record*, Sept., 1901.

498. **Bellencontre.** Late detachment of the retina after resection of the cervical sympathetic for exophthalmic goitre. *Mém. et bull. d. l. soc. franç. d'opht.*, 1901, p. 347.

499. **Rogman.** Is there amblyopia ex anopsia? *Ann. d'ocul.*, cxxii., p. 175. (Histories of three cases indicating an amblyopia ex anopsia.)

500. **Zimmermann** and **Chance.** Glioma of the retina without sequelæ. *Annals of Ophth.*, July, 1901.

501. **Gifford.** A case of blindness from drinking cologne spirits (methyl alcohol). *Ophth. Record*, July, 1901.

502. **Lewis.** Hemorrhages of the retina. *Annals of Ophth.*, July, 1901.

503. **Zentmeyer.** Three cases of alcohol-tobacco amblyopia presenting retinal hemorrhages. *Annals of Ophth.*, July, 1901.

504. **Berry.** Hysterical eye affections. *Edinburgh Hospital Reports.*

505. **Friedenwald.** Syphilitic retinitis. *Ophth. Record*, Aug., 1901.

RÖMER (495) found ophthalmoscopically in the region of the macula and about it large white patches and smaller plaques, in a man of thirty-four, with nephritis. The picture resembled somewhat that of retinitis, but the patches were rather larger. On microscopic examination the white plaques were found to consist of concrements in the inner layers of the retina, which broke down when sulphuric acid was applied, showing that they were of calcareous nature. The author believes that liquid

exudations from the vessels had been precipitated and then had finally undergone calcareous degeneration.

NOHL (496) adds to a detailed *résumé* of the literature his own observations in regard to the symptomatology of quinine amaurosis. The different types cannot be gone into here, and the perusal of the original paper is recommended. In the section on prophylaxis and therapy the author states that dosing with quinine is difficult on account of the difference in individual susceptibility. The therapy consists first in stopping the quinine. The only method of treatment which increases the acuteness and the field of vision is the subcutaneous injection of strychnine into the temple. As to the nature of the affection, Nohl agrees with Holden, Birch-Hirschfeld, and others, who believe that there is a direct toxic action upon the multipolar ganglion cells of the retina with a subsequent ascending degeneration of the optic nerves.

BEAUDOUX (497) relates the case of a man, nineteen, who was struck on the right side of the head, and became blind in the left eye. Examination showed a milky-white discoloration of the fundus characteristic of commotio retinæ, together with disseminated gray patches and subchoroidal hemorrhages. There was a large central scotoma, leaving a small peripheral field of indistinct vision. Interest centres in the fact that although the ophthalmoscopic appearances became normal in about four weeks the vision did not begin to improve for two months. After eight months the vision became normal. ALLING.

ZIMMERMANN and CHANCE (500) report a case of glioma of the retina, in which no recurrence had taken place five years after enucleation. ALLING.

The interesting feature of the case of GIFFORD (501) is the fact of complete recovery of vision after a history of total blindness. Only one other similar case is known. ALLING.

LEWIS (502) reports the case of a man, forty-six, with persistent albuminuria, who had two attacks of hemorrhage near the optic disc, from which he recovered with normal vision. The interesting features are the absence of involvement of tissues surrounding the blood clots, the exceedingly short time in which complete absorption took place (one month), and the excellent condition of the patient after the lapse of five years. ALLING.

In such cases as a means of suggestion BERRY (504) recommends the subcutaneous injection of distilled water beneath the

skin of the forehead combined with the assurance that the condition present will be completely cured by it.

He has tried this on cases of functional ptosis, blepharospasm, amblyopia, and conjunctivitis, all of which conditions have been cured by it. MARSHALL.

FRIEDENWALD (505) relates a case of syphilitic retinitis in a man aged thirty-eight, who, after an attack of iritis, presented opacities in the vitreous, numerous small hemorrhages in the inner-upper portion of the retina, with the vessels in the superior nasal region either exceedingly attenuated or entirely wanting. White spots, previously found in the macula region, had disappeared without trace of atrophy or disturbance of pigment. Only slight evidence of choroiditis was found. The writer regards the case as unusual in being a practically pure syphilitic retinitis due to endo- or perivasculitis. ALLING.

XX.—OPTIC NERVE.

506. **Sourdille.** A contribution to the pathological anatomy and to the pathogenesis of optic-nerve affections in cases of brain tumor. *Arch. d'opht.*, xxi., Nos. 7 and 8. (With illustrations.)

507. **Cyriax, E. F.** Optic atrophy and tabes dorsalis. *Lancet*, June 29, 1901.

Two cases of brain tumor and one of pachymeningitis hæmorrhagica, observed clinically and studied anatomically, gave SOURDILLE (506) opportunity in a very interesting paper to discuss anew the development of choked disc, and to examine the previous theories in respect to it. He believes that the Schmidt-Rimpler-Manz theory and the Leber-Deutschmann theory explain neither the clinical symptoms nor the histological changes. The theory of Parinaud, however, which assumes an extension to the optic nerves of the œdema of the brain, caused by hydrocephalus internus, seems more in accord with the facts. The author does not agree with Parinaud, however, in referring the œdema to a lymph stasis, but he shows that œdema of the third ventricle, whose neuroglia completely surrounds the chiasm, is communicated directly to the chiasm and optic nerve. The nerves suffer a constriction in passing through the optic foramen, which leads to a venous stasis with hydrops of the sheaths of the nerves, in which the cerebro-spinal fluid takes no part. After compression of the central vessels there develops in the disc a collateral circulation between the vessels of the lamina cribrosa and those of the scleral ring and choroid. The distension of the

vascular network of the lamina cribrosa is the chief cause of the choked disc. The later atrophic changes begin in the optic canal, and extend both peripherally and centrally. Other affections also may produce the picture of choked disc, provided that the swelling of the optic-nerve trunk and the constriction in the optic canal take place, as in inflammation of the sphenoid sinus and some affections of the orbit, and particularly in the case of tumors of the nerve. v. MITTELSTÄDT.

CYRIAX (507), taking into consideration the fact that double optic atrophy, coming on early in locomotor ataxy, appears to arrest at least for a time the progress of the disease, thinks that the explanation may be the following: The patient, in consequence of the failure of sight, has to rely more and more on his muscular sense, and he is at all times actively engaged in trying to repair and re-educate these senses, which are partially lost. The beneficial effect of co-ordinate gymnastic exercises is well known in this disease, and with optic atrophy present he is really at work in this way every minute of the day, and hence the arrest or improvement of the disease. He has never known a case of a man previously blind developing tabes.

MARSHALL.

XXI.—INJURIES, FOREIGN BODIES, PARASITES.

508. **Pichler.** A new case of multiple hemorrhages in the skin of the head and the eyes after compression of the thorax. *Zeitschr. f. Augenheilk.*, vi., 2.

509. **Fuchs.** On the changes at the macula after contusion. *Ibid.*

510. **Holmström.** Thirty cases of iron splinters in the eyes with remarks on the magnet operation. *Hygiea*, May, 1901.

511. **Rochat.** A case of intraocular cysticercus. *Ned. Tijdschr. v. Geneesk.*, ii., No. 4, 1901.

PICHLER (508) reports a case of multiple hemorrhages of the head and eyes similar to that recently reported by Wagenmann. A boy of ten was run over and dragged for some distance. Violet-colored hemorrhages occupied the greater part of the skin of the head, face, eyelids, and bulbar conjunctiva. No retinal hemorrhages. In explanation the author assumes a forcing back of the blood in the veins of the head which have no valves. The high tension in the eyeball prevents the forcing back of blood into the interior of the eye.

Recently the formation of holes in the retina at the macular region has excited considerable interest. FUCHS (509) had the opportunity of examining such a case anatomically. The retina

was slightly detached in the region of the fovea. A great cavity occupied the fovea itself. This was covered anteriorly by the limitans interna, and extended backwards to the outer nuclear layer. Several smaller cysts lay near the large one. Fuchs believes that there was no actual hole in the retina. If, however, the thin walls of such a cyst should rupture, the picture of a complete hole at the macula would be present.

In the years 1894–1900 HOLMSTRÖM (510) treated 30 cases of iron splinter in the eye. The extractions were made partly with the Hirschberg magnet and partly—since 1897—with the Haab magnet. Of 7 cases in which the splinter lay in the anterior half of the ball, extraction was accomplished in 6, with preservation of perfect vision in 2, and partial vision in 4. In 23 cases the splinter lay far back in the eye. In 19 of these the patient came under observation early. In 3 extraction seemed impossible and enucleation or exenteration was done. In 2 expectant treatment was followed, the result being siderosis in one case and disseminate choroiditis in the other. Of the 14 cases in which extraction was attempted, it was successful in 12. In 8 perfect or good vision was obtained. In the 4 cases in which the patient was first seen long after the injury, no attempt at extraction was made in 3 cases, and a vain attempt in 1.

DALÉN.

XXII.—OCULAR AFFECTIONS IN GENERAL DISEASES.

512. **Falkenheim.** On amaurotic family idiocy. *Jahrbuch f. Kinderheilk.*, vol. iii., 1901. S. Karger.

513. **v. d. Brugh.** Diabetes and myopia. *Ned. Tijdschr.*, 1901, vol. ii., No. 4.

514. **Coppez.** A case of optic neuritis from beri-beri. *Bull. d. l. soc. belge d'opht.*, Apr. 27, 1901.

515. **Bettrémieux.** A case of photophobia and oculomotor disturbances following an injury of the occipital region. *Ibid.*

516. **Dor.** The relation of non-myopic affections of the retina to cardiac affections in general and mitral stenosis in particular. *Bull. d. l. soc. nat. de méd. d. Lyon*, May 20, 1901.

517. **Vignes.** Bitemporal hemianopsia. *Bull. d. l. soc. d'opht. de Paris*, July 2, 1901.

518. **Maynard, Major F. P.** Some ophthalmic complications of plague. *Brit. Med. Journ.*, Sept. 14, 1901.

V. D. BRUGH (513) shows that according to the investigations published in regard to the change in refraction caused by the presence of sugar in the various media of the eye, hyperopia should

be found in diabetic patients and not myopia. The causes of myopia in diabetes must be sought elsewhere.

The author believes that the surface of the lens owing to a slight swelling becomes more curved, thus producing myopia.

JITTA.

COPPEZ (514) presented a man of fifty-three from the Congo state with beri-beri, in whom change of climate produced only transitory improvement. Four years after the beginning of the disease, disturbances of vision began. V = $\frac{1}{18}$ each, central scotoma, hyperæmia of the discs, tortuousness of the retinal veins. Treatment consisted in injections of strychnia, iodide of potassium, and diaphoretics, which improves the vision to $\frac{1}{8}$. The patient was a smoker and suffered from malaria also, still the author refers the retrobulbar neuritis to the beri-beri and cites analogous cases observed by Läma, Laurenço, Tillier, and Correa de Bittancourt.

BERGER.

In BETTRÉMIEUX'S (515) case, after an injury of the right occipital region which necessitated trephining, there was ptosis (right more pronounced than left) with a certain fixity of gaze and hyperacusis. The mobility of the eye was less restricted to the right than to the left. The author assumes a diffuse superficial encephalitis of the cortical centres for ocular movements as the cause of these symptoms.

L. DOR (516) believes that most cases of non-myopic detachment of the retina (albuminuria, syphilis) are dependent upon an affection of the heart and particularly mitral stenosis.

Through the diminution of the intravascular tension, a diminution of tension in the vitreous is brought about, while a stasis in the venous system, particularly in the venæ vorticosæ, causes an increased transudation into the choroid. The pressure on the retina from within is less than that from without, and to this condition is the development of the detachment to be attributed.

BERGER.

Major MAYNARD (518) has found eye complications far more frequently in patients suffering from plague than is usually supposed to be the case. During the recent epidemic in Patna he came across 12 cases with eye complications and all were suffering from a severe attack of plague. Of the 12, 6 recovered with one good eye, while in the remaining 18 eyes the following lesions were noted:

Cornea—hazy in 4, opaque in 2, sloughed in 4.

Iris—iritis was met with in 12 cases either slight or very severe, in 3 others there was prolapse of the iris.

Sclera—scleral staphyloma in 2.

Lens—hazy in 7 and opaque in 5. Media hazy in 6.

Fundus normal in 3, hemorrhage in 1, and limited pigmentary retinitis in 1.

Tension diminished in 12, and normal in the rest.

Vision nil in 5, P. L. only in 8, and fairly good in 5.

Fig. 1.

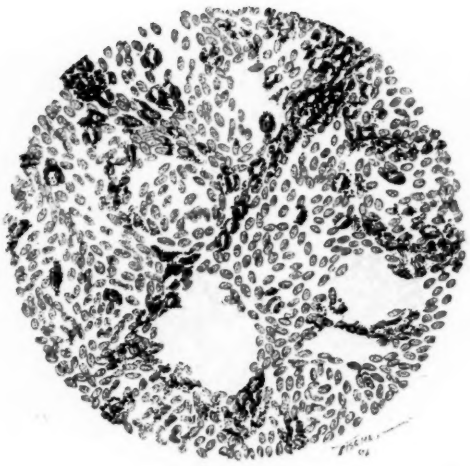

Fig. 2. *Wood.*

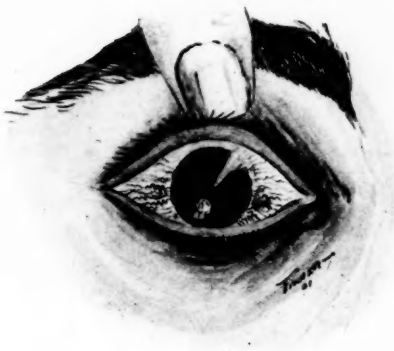

Fig. 3.

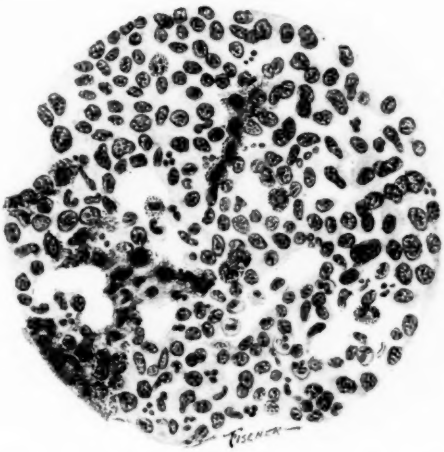

Fig. 4. *Pusey Coleman.*

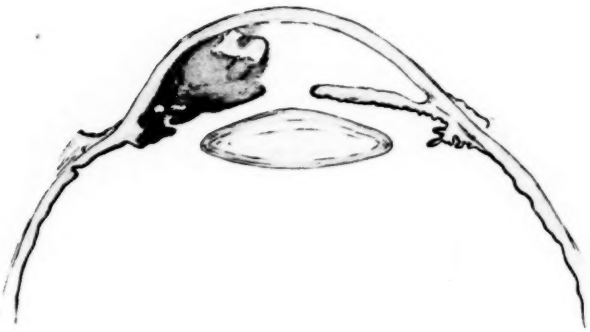

Fig. 5.

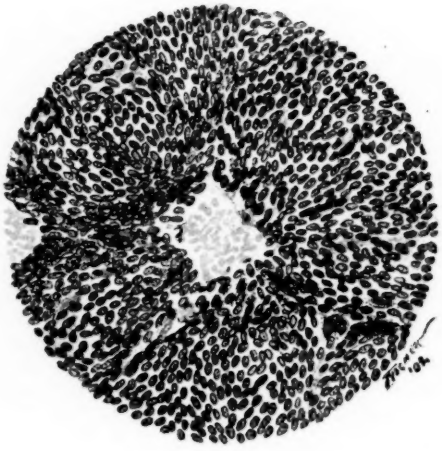

Fig. 6. *Denig.*

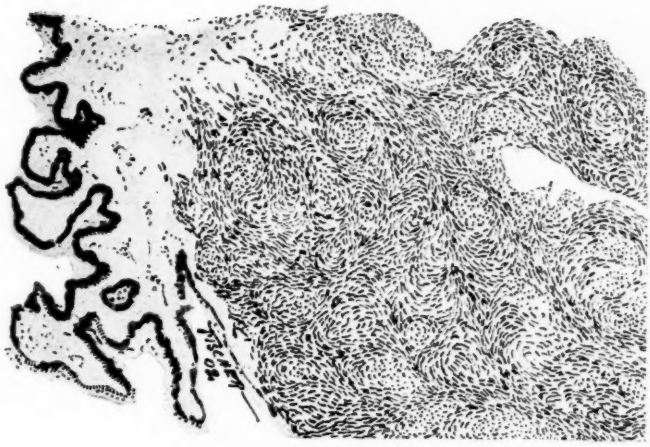

Fig. 7. *Hatz.*

Fig. 8. *Friedenwald.*

第壹圖

第七表

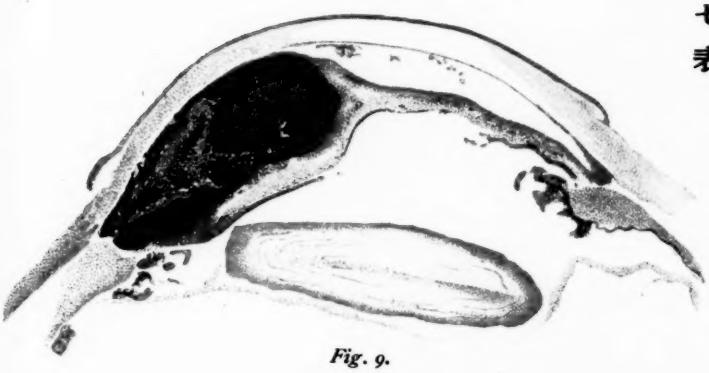

Fig. 9.

第二圖

Fig. 10.